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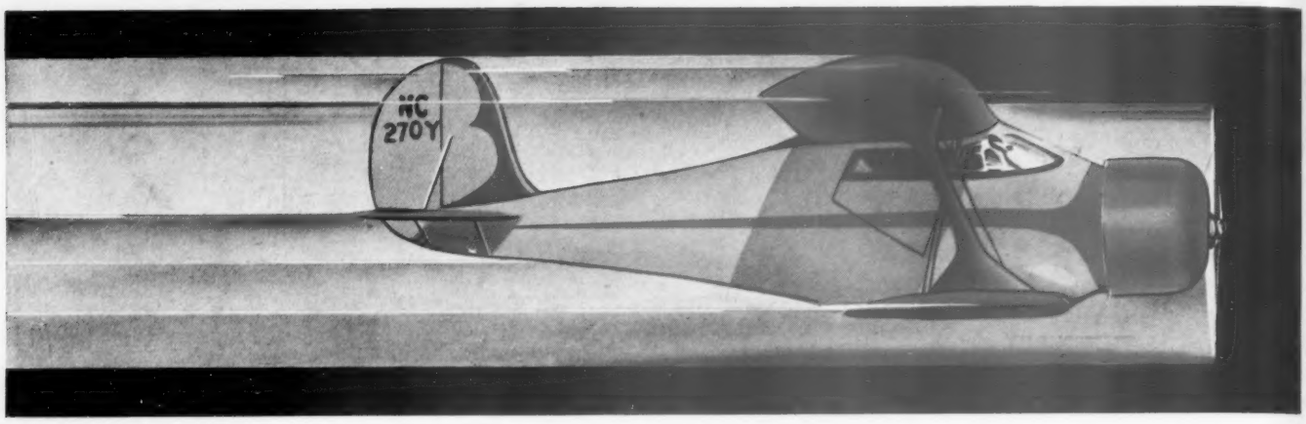

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RESOURCES

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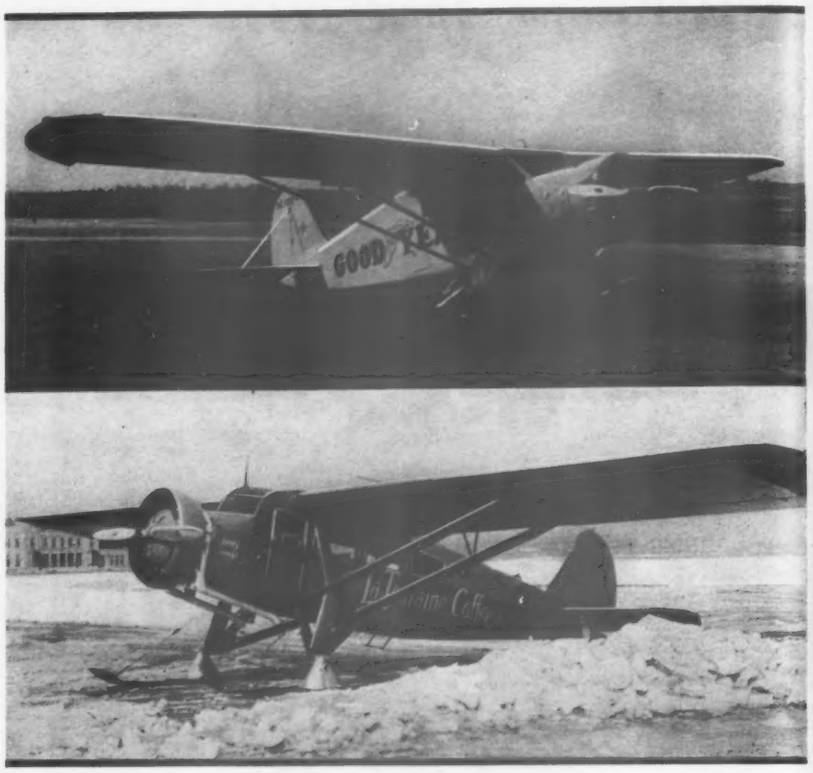
McLaughlin Aerial Surveys

Aircraft at Work

There has been a lot of talking about airplanes for business use since 1929, but only a small part of it has been done by the people in the best position to know. Now the owners of business planes have spoken for themselves. What most of them say is that they couldn't get along without their ships, and that if their neighbors and competitors are wise they will step out and buy airplanes of their own. With most of the customers acting as volunteer salesmen, it looks like a good year.

A DISTRIBUTOR of caterpillar tractors finds that with an airplane he can go straight to headquarters and talk to the boss of the company he is trying to sell, where previously he would have limited himself to third-hand contact through minor representatives in the field. A surgeon, who is also a ranch-owner, keeps in touch with both jobs by hopping back and forth by plane between the ranch and his practice in a city far away across a mountain range. A manufacturer of waxes and polishes uses his plane to fly distributors and large customers to his plant, where they can see for themselves what they are getting. A Midwestern capitalist uses his personal plane for dropping in for inspection of scattered properties in which he is, or may become, financially interested. The owner of a chain of newspapers find a company airplane indispensable to keep in personal contact with them. The president of a company manufacturing publicity material reports sales tripled by the increased territorial coverage that the company airplane has permitted and by its advertising value. A South African merchant of dry goods imports an American airplane to carry a salesman and his cases of samples to widely scattered settlements. A ranch owner in Texas uses a plane to bring supplies and machinery to the ranch in emergencies,

and to carry live deer and other game safely and swiftly from the point of capture to the point of delivery. A fishery uses planes to spot the movement of schools of fish. A mine saves both time and money by using airplanes for the transportation of heavy machinery and of ore concentrates. A contractor uses a plane not only to reach the site of a job in prospect, but to inspect it from the air for a better understanding of its difficulties before bidding. The sales manager of an oil company travels 25,000 miles and chats with a great number of groups of dealers in 22 days by using his company's airplane. A moving picture company scouts for locations by air. A contract operator of trucks uses a plane to supplement truck service on super-rush shipments. Another trucking operator rushes a service man and repair parts out to any trucks that break down on the road by plane, in preference to leaving them dependent on local garages. An automobile company uses a number of company-owned planes to pick up groups of dealers and carry them on a tour of the company's plant for a preview of the new models. A plane owned by a state government serves for visual surveys of extensive flood conditions preparatory to the planning of relief work, and for the transport of payroll funds. A maker of containers sends a man out to spot from the air straw stacks which can be purchased for making straw paper, doing the work more thoroughly and effectively than it was previously done by automobile and in one-fifth the time. A petroleum refining company finds that offering large customers trips in a company-owned plane is a distinctive and memorable form of customer entertainment, and highly effective in building good will. A state conservation department keeps a lookout from the air for violations of fire and game laws, and has completely stopped illegal netting in lakes as a result. A public utility uses a plane for making quick inspections of its transmission lines and the conditions around them, and for surveying routes for new lines.



A state conservation department keeps a lookout from the air for violation of game laws

There is practically no limit to such a catalog except the patience of the reader. The uses that business and professional men have found for the airplane cover the scale from deepest bass to squeakiest treble. Nor are all these multitudinous employments the products of the imagination of aviation enthusiasts. These are people who bought airplanes because someone convinced them that they would improve their business or save money by doing so, and of those who have tried the experiment a vast majority will rise up now on invitation and declare that they were right.

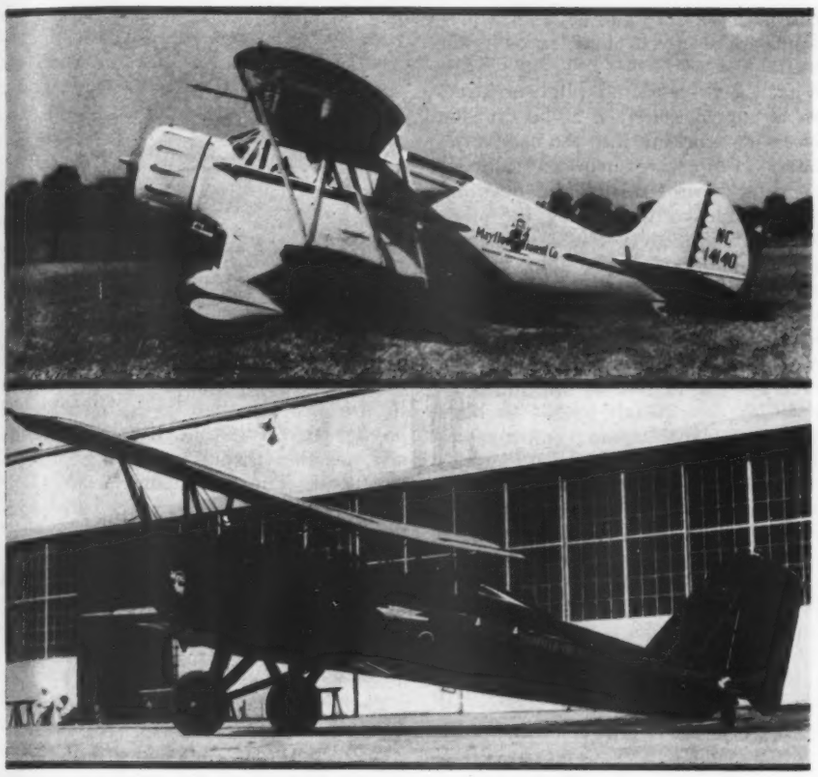
A lot of bunk has been talked about this industrial - airplane business. In the dear dead diamond-studded days of 1929 a few corporation presidents let themselves get hypnotized into buying large and expensive and ornately decorated aircraft which their business didn't need any more than it needed a racing stable. Their experiences made it possible in due course for somebody to get a grand ship at a second-hand price, and it soured all their directors and all their directors' friends on aviation as a business adjunct. On the other hand there were in 1929, and there still are, those who without taking the trouble to investigate the matter assumed that the purchase of any kind of an airplane by any kind of a company was a confession of lunacy and that any employee who even suggested such a thing would bear looking into. Out of uncritical extravagance on the one hand and uncritical prejudice on the other, after five years of depression some nuggets of fact can be sifted.

The plainest fact is that over two hundred companies not directly in the aviation business now maintain company-owned planes. It is a fact that in some lines a roll-call of airplane owners would be practically a directory of the industry. It is a fact that the ingenuity of owners and the pressure of unexpected emergencies are discovering new uses for the airplane almost weekly.

But those are generalities. We wanted to go beyond that and to go deeper, so we went to the one indusputable source. We went to the owners of the airplanes, and we asked them to tell us about themselves and their opinions of the present-day airplane and of the airplane industry. They responded in bulk. What follows is their story.

Industrial Users and Their Airplanes

THEY are scattered in every corner of the country and in almost every state. Some of them own as many as five planes, but most have a single one and use it intensively. The variety of their business and the originality of the uses that some of them find for an airplane have already been hinted. But most of the industrial owners do nothing spectacular or unusual. A request to "describe some of the most interesting uses that have been made of your plane in particular cases" produced in most of them a complete mental blank. "You might as well ask," they imply, "what is the most interesting use that a suburbanite makes of his commutation ticket. When we have to go a hundred miles or a thousand in a hurry, we get out the plane and go. It always save us time and trouble, it often saves us money, and every now and then it gets us business that we couldn't possibly



A maker of containers sends a man out to spot from the air straw stacks which can be purchased for making straw paper.

have had otherwise. What of it? We're up-to-date people, and we use up-to-date tools."

The general shrug of surprise that anyone should be surprised at an industry's use of an airplane or think it worth particularly inquiring into is the best possible promise of a bright future for aviation in industry. Once upon a time somebody remarked that a satisfied customer is the best salesman, and several million people have repeated it since. Taking that as a point of departure, aviation enthusiasts are justified in throwing their shoulders back and putting on a broad grin at the news that three-quarters of the companies and professional men responding to AVIATION's request for information say flatly that if they now had no plane, but knew all that they now know about its application to their business, they would rush out and buy a new ship without delay. Of the remaining and less assured quarter, about a third aren't quite sure but think they would be quite likely to buy. Another third feel that they couldn't afford it now but would certainly be in the market for a ship as soon as their business improved (and suitable comment on that was made by an executive of one of the largest piston ring companies, who writes: "In our opinion *a plane is a distinct aid to normal business and even more essential when times are bad!* Why wait for business to return to normal before purchasing a plane at a time when action and effective contacts should be the order of the day? A man in trouble would not solicit help on a bicycle if there was a telephone available."). There remain only about 10 per cent of the present owners who are convinced by experience that a plane doesn't fit their case and that they shouldn't have one. In some of those instances it is plain that they had no idea in getting the plane originally except to accumulate a little local publicity, or that they have been using it unwisely or under unfavorable conditions. Even discounting all that, to have 90 per cent of the purchasers of a piece of equipment as revolutionary as the airplane reasonably satisfied with their bargain, and 75 per cent of them enthusiastic and anxious to say so, is better than first-class.

A fishery uses planes to spot the movements of schools of fish.

Then we put another question along this same line, but more far-reaching. We asked: "Is your situation exceptional, or would most firms in your line of business benefit from having a plane?" To that the piston ring manufacturer quoted made the highly practical reply: "The day when all of our competitors have airplanes will be the day when we lose our advantage by owning one." The man who is most enthusiastic about his own use of a plane ought then to be the loudest anti-airplane propagandist, in the hope of discouraging everybody else from getting in on a good thing. Nevertheless, from almost exactly two-thirds of our airplane-owning correspondents come confident assurances that any company that isn't now running a plane could improve its position by getting one. Several more are inclined that way but hedge the issue by "believing that many would benefit," or the like of that. From some industries comes a virtually unanimous vote in favor of continued ownership of airplanes for the writers and for everybody else in the business.

The customers proved their satisfaction again when they were invited to find fault with the present-day airplane and to suggest improvement. Most of them had no changes to propose. Several went out of their way to go on record as thinking the current product too fine a job for an outsider to criticize, and those who did make suggestions made them under the conventional headings of wanting better performance, lower cost, and easier flying qualities. Only one or two were outspoken in demand for higher speeds, and most of those who looked forward to lower costs recognized their dependence on increased volume. A somewhat widespread desire for more baggage space and more carrying capacity generally conforms to critical type, for no doubt the same people would have made much the same objections about their cars as they do about their planes. The man with a three-passenger ship will wish every now and then that he could carry a fourth, and the man that buys one for eight passengers will periodically lament the necessity of leaving a ninth on the ground. The aircraft industry will never make a complete answer to that criticism until it combines variable-area wings with extensible cabins.

Naturally the industrial owner's

opinions of his airplane, of airplanes in general, and of airplane manufacture and salesmanship depend largely on how he happened to buy his own ship and how he has been operating it. Surprisingly few of the present owners report themselves as having been sold from scratch by deliberate campaign. The great majority were converted from within, and trace their ownership of a plane to the persistently persuasive efforts of some aviation enthusiast in their own organization.

How many firms that might profitably use airplanes are not using them now simply because no one has drilled away at the matter long enough to overcome the natural inertia and conservatism of their officials is a matter of speculation, but undoubtedly there are many hundreds.

Unless there is a pilot already in the organization to whom a plane can be assigned, companies purchasing ships have had to decide whether some official would learn to fly himself or whether a

Where the annual total of flying is from 100 to 200 hours the pilot clearly ought to have some other place in the company.

professional pilot should be hired. Most of them decide on the latter, for of all the company-owned planes of which we have record about 55 per cent are flown by pilots hired for the purpose and a majority of the remainder by company officials who already knew how to fly before the plane was acquired. Only in very few instances has the owner learned to run his own ship and then let a professional pilot go to take it over for himself.

Where a professional pilot is hired, there is approximately a 50-50 division between his working into the company's business and giving help on sales or research or, on the other hand, devoting his time exclusively to flying the plane and in watching over its maintenance. Where a plane is flown four or five hundred hours a year, as is sometimes the case, piloting and supervising it is likely to become a full-time job. In the commoner case where the annual total of flying is from one to two hundred hours the pilot clearly ought to have some other place in the company, especially if the business has any sales activities particularly closely connected with the use of the plane. A considerable proportion of owners who have wanted a pilot more expert than they thought they could readily develop within their own ranks, and have at the same time thought it difficult to mix piloting with sales work, keep a local airport operator or flying instructor on a retainer basis and are assured of being able to call on him whenever a trip is to be made. The small group of owners that have had full-time pilots who do nothing except fly a plane and apparently don't do much of that contributes much more than its share to the dissatisfied group who probably or certainly would not buy again if they didn't have their present ship. The suggestion that they have been unfortunate in their pilots is strong, and so is the reminder of the importance of getting for such a job a man who is not only highly skilled and suitably careful but who will take an active interest in the company's affairs and keep his imagination busy on ways of using the plane to the advantage of its owner's business. There are plenty of men of this type now to be found, and airplane distributors are almost unanimous in recognizing and assuming responsibility for helping the owner to locate one of them. Of that, too, more later.

An airplane for the sales department is not very different from a new and somewhat expensive piece of automatic

Owner after owner asserts that he uses his plane as an actual means of saving money.

machinery for the factory. Every business man that you talk to will agree in the abstract that he is in favor of buying anything that will pay for itself, whether through lowering production cost, improving the product, or strengthening the sales force. In practice, about one organization out of twenty will be sufficiently alert to discover a brand-new tool for itself and to go out and investigate on its own account the possibility of applying it usefully. The other nineteen will wait to be persuaded, or at least to be furnished with facts and figures. That mythical figure, the average business man, usually isn't much disposed to set sail by himself on the troubled seas of analysis of the economics of new equipment. He much prefers to have someone else hand him the story, all properly indexed and illustrated.

The percentage of those who will look into aviation of their own motion without some personal stimulus is particularly small, for although the theory that aviation is a harebrained and hazardous enterprise has now been abandoned by all but the super-conservative, the belief that it must be extremely costly persists. Of intelligent business men with a good knowledge of what goes on, but with no special acquaintance with aviation, certainly a very small minority realize that a four-passenger airplane will take them as far on a gallon of gas as will a high-priced roadster, and fewer still recognize that a plane and its engine will go materially farther without any major attention or adjustment than any car ought to be expected to. Owner

after owner among those business men who fly themselves asserts that he uses his plane as an actual means of saving money on long trips with one or more companions, and some of them are candid enough to admit their own astonishment at having discovered that it could be done.

The Salesman Looks at the Customer

IF AIRPLANES are to take the place in industry to which the record makes them seem entitled they will have to be sold, and the attitude and the experience of the salesman are important both to the salesman himself and to the possible customer. As we surveyed the industrial field we approached the matter from both sides. We asked the airplane owners what they thought about airplane salesmanship, and we asked a selected group of distributors to tell us about their own jobs, with special reference to the industrial market.

From all this miscellaneous comment on sales methods, there emerges one almost constant factor. Whatever his other deficiencies may be in individual instances or whatever the distributive organization of the industry may yet lack, the airplane salesman has learned to present flying as a business auxiliary and not as a roller-coaster ride. In all our correspondence with airplane owners, we find only two protests that salesmen have made demonstrations too showy or that their manner of presentation of their case has been too reminiscent of the wing-walking days. The technique of planning a campaign around the introduction of the airplane into industry may still be imperfect, but all hands agree that the intentions are good.

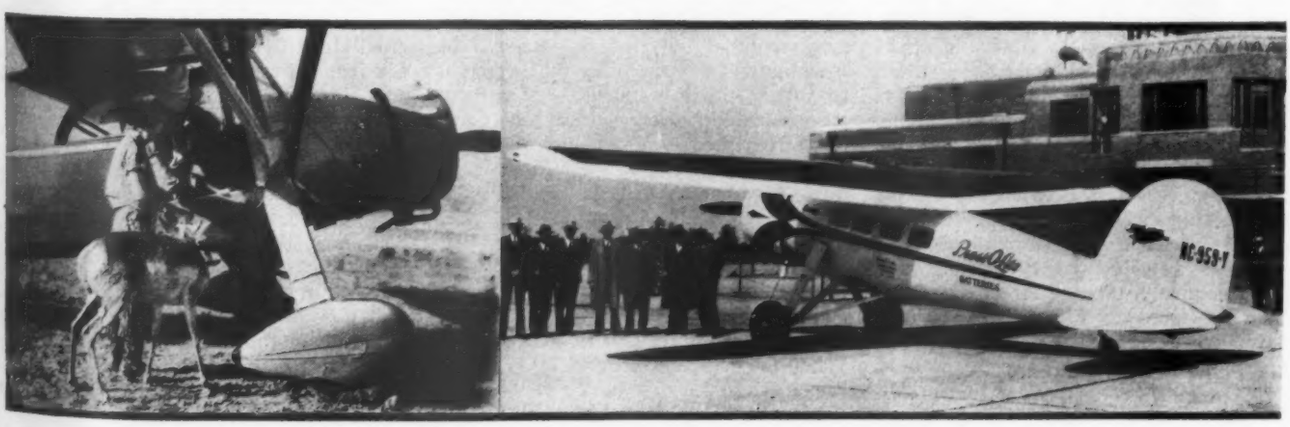
If the distributors who answered our questions could be taken as a fair sample, and if there were ten times as many of them as there are, the business of selling airplanes would have no apologies to make for its staff. A certain number of replies come from men who seem to be wandering in the fog with no definite plan of action and hoping to make sales by stumbling over them, but they are conspicuous by rarity. The great majority show a very clear understanding of the state of mind of the average prospect, and a very keen sense of the ways in which it could best be met with methods duly adapted to the psychological and commercial circumstances of the individual case.

The plane must be fitted to the individual case. Therefore the individual case must be understood. It is a curious fact that some of the present owners of planes criticise the airplane sales organization severely for failure to analyze the individual prospect and his requirements, yet most of the distributors who have given us their views emphasize repeatedly the necessity of doing just that. The explanation may be that many of the present owners bought their planes four or five years ago and got their ideas at that time, and that salesmen in 1935 are doing a better and a more businesslike job than in 1930 or 1931.

Whether or not individual treatment should extend to the point of actually putting a plane to work in the customer's business for a time as a demonstration is a disputed question. A number of the present owners feel that such a proposition ought to be very much worth while and that the failure of salesmen to make it, as an automobile salesman often lets a prospective buyer take a car for a week-end, is a sign of backwardness. The owners can presumably be exempted from any suspicion of selfish interest, as they already have airplanes and are not in the market for free rides, but in any case most of the distributors rebut that if they start giving demonstrations of that sort they will find themselves doing gratis jobs on such a scale that they would have to give up their regular charter service to attend to the free demonstrations and that they would never be able to make enough commissions to cover expenses. Some of them, to be sure, look with sympathy on a determined concentration on a few really good prospects and on giving them everything that could possibly be thought of in the way of a demonstration and keeping at it until they are finally convinced of their need for their own plane. Others occupy the middle ground of offering to do jobs, in connection with the business of the prospective customer at below regular charter rates and to refund the amount paid for the flying out of the price of any airplane that he may subsequently purchase.

This matter of the type of demonstration that best shows off the capacity of the plane without making unreasonable demands on time or running the distributor into unreasonable expenses is obviously one of immense interest. One of the largest Pacific Coast distributors believes that most of the selling can be done on the ground and that demonstrations should be limited to "short, conservative hops." Several others put it in effect that local demonstrations, if carefully enough planned and dramatized to keep the customer thinking of the plane always in terms of his own business, should make long trips or the loan of a plane for extended business trial quite unnecessary. Much of course depends on the type of business involved and on the type of customer. It is something of a surprise to find that about two-thirds of the distributors who expressed an opinion consider the business small

Is it appropriate for the salesman to mention that the Muskie are running up at Mackinac?



enough to be under one-man control a better prospect for an airplane, as a rule, than the large corporation. One reason apparently is that the small business lends itself best to the type of selling campaign with which the distributors are most familiar and which they generally favor, that revolving around a demonstration at the airport. With the big corporation much more is likely to depend on rigorous analysis of costs and operating figures, and the distributors who are most inclined to rely on statistical analysis as a primary selling tool are likely also to prefer the large corporation to the small one as a target. From hard-headed New England, appropriately, comes the most enthusiastically whole-hearted supporter of the analytical method. Others complain that the big company commonly refers the matter of purchasing a plane to some subordinate official for investigation without giving him final authority and that after he has taken a demonstration trip, however guiltless he may be of any previous aeronautical connections, his superiors begin to regard him as an aviation enthusiast and to discount whatever he says.

All of a piece with the discussion about the kind of a demonstration to put on and how much use to make of statistics is the argument over the degree of solemnity that a sales campaign should preserve. Are business airplanes to be sold for business alone, or is the president of the company that might buy one to be given a gentle reminder that they serve other purposes? Is it appropriate, along with the talk of the dizzy speed with which the sales manager can visit distributors, to mention that the muskie are running up at Mackinac in the spring and the ducks are going over Currituck in the fall, and that with a plane either spot is within easy reach for a week-end? Most of the distributors play the recreational note pianissimo unless the prospect gives them a strong lead in that direction, but some advise trotting the vision of recreational use out into the foreground at the very first approach and keeping it there. The majority vote is against them, for the majority belief seems to be that the big market is in selling planes for straight business use and that as their business ability is better understood flying after pleasure will play a diminishing part.

Presumably, too, as home-staying people get more and more used to flying the feeling of men's families will lose whatever influence it now has in determining whether or not they as officials of business organizations shall cast their vote in favor of the purchase of a company plane. At the present time the family influence is sometimes a very real one, and it is one on which distributors with experience in the field express themselves with considerable freedom. The weight of sentiment seems to be in favor of keeping a demonstration on a purely business basis and leaving the wife and children out. Typical is the remark of a distributor in southern California that: "I find it inadvisable to take any other than the actual sales prospect along on a demonstration flight, as the more persons he has with him the less chance we seem to have of consummating a

Many a wife has closed a sale by becoming enthusiastic when her husband was in doubt.

sale." Too extreme to be typical is the view of a misogynist from the Middle West: "There is too much risk of unfavorable comment from the family. I *know*, and can cite proof if required, that women are holding back the advancement of aviation *terrifically*. The wife still wants security above all else, and she sees her security definitely endangered by this new whim, as she considers it, of her husband." Also from the Middle West comes the more sympathetic observation: "Not until the prospect has been carefully diagnosed and is slipping away is it advisable to have the family along. Many a wife has closed a sale by becoming enthusiastic when her husband was in doubt."

Whatever doubts wives may or may not entertain about the security of aviation, their husbands have apparently ceased to worry. Nothing is more striking in this survey than the strength of the consensus that the alleged hazards of flying have virtually ceased to be a serious factor in sales resistance. Objections now seem to be almost exclusively economic, fear of high maintenance cost, objection to first cost, and suspicion that not enough uses will be found for the plane after it is bought to justify the investment. As present plane owners themselves have been quick to testify, the average business man has little idea of how low the cost of operating an airplane will run, and his objections on that score can be met by presenting and proving actual figures.

The citation of sales resistance, however, comes back over and over again to the factors of general inertia and indifference that have first to be overcome. When the prospective customer has once been persuaded to give his definite objection to flying the sale is well on the way to being made, for definite objections can be definitely answered. The toughest state of mind with which to deal is that of vague and courteous half-heartedness, and it can best be met, where the necessary material exists, by presenting circumstantial records of the successful use of airplanes by other firms in the same kind of business as the sceptic. With duly deferential acknowledgment to its owners, the injunction to ask the man who owns one ought to be borrowed by sellers of aircraft.

For that reason, as well as in the general interests of cooperative behavior, the distributor that sells a plane usually stands ready to get out of bed on the coldest night of winter, or to undergo practically any other personal inconvenience that may be necessary, to help the purchaser get satisfactory service from the ship. Testimony of successful distributors is almost unanimous on the desirability of helping the new owner to find a suitable pilot and of advising him on servicing on the installation of special equipment, on the practicability of particular flights and flying schedules, or on anything else that may come up. Some go so far as to recommend a regular check on all ships, particularly those sold to industrial users, at intervals, for a year or so after the sale to make sure that the pilot is doing a proper job and that no opportunity of fitting the plane into the organization is being overlooked. Contrariwise, if a distributor gets too much involved with a customer's affairs, and if the customer after purchasing the plane tries to make it do the impossible, he will descend on the salesman with fire in his eye. As one old hand suggests, the industrial owner who runs into any difficulty or uncertainty ought, if the distributor has done his job properly, to come back with friendly inquiry: "What'll I do about this?" rather than with declamatory accusation: "Look what you got me into!"

The best possible guarantee of the future of industrial use of airplanes is in the very fact that it has been possible to conduct such a survey as this and to get so many thoughtful opinions and so many records of actual experience both from distributors and from owners. The original technique of selling airplanes for business was to get someone all excited about flying and then rush him off his feet before he spent the money for something else. The depression spiked that style of selling, but the development of the aviation business would have done so in any case. Whether considered from the point of view of the airplane manufacturer, the salesman, or the ultimate consumer, the purchase of an airplane for business need be no longer an adventure. For the hundreds of businesses that now have airplanes, and for many hundreds or thousands more that do not have them now but should and one day will, it has assumed the respected rank of an investment.

The Airplane Opens the Door for the Salesman

The direct advantages of an industrial airplane for executive transportation and for the specialized needs of many particular lines of business are obvious. The indirect gain in prestige and in impression made on the mind of the customer from the ownership of a plane is less immediately apparent, but sometimes even more important. The time will come when the ownership of a company airplane will be no more distinctive than the presence of a blonde receptionist in the front office, but it hasn't come yet in most industries, and for most companies the opportunity still exists of getting the credit that goes to a leader. Mr. Wassall tells a few true stories to prove the point. He has sold machinery without the use of airplanes, he has sold machinery (more successfully) with the use of airplanes, and he has sold airplanes to others who might make equally good use of them. So mixed an experience invites respectful hearing.

By C. R. Wassall

"RIDE in an airplane? I wouldn't get within a hundred feet of one of the things, let alone ride in it." That was just fine, because I was not selling airplanes or rides. I was trying to sell machinery, and the gentleman who made that remark had it in his power to give me the order for it.

I had been calling on him for several years, but he had always bought from one of my competitors, whose machines were entirely satisfactory as to quality and price.

He was a busy man and saw no reason why he should be bothered by me or any one else trying to change his usual custom. He had standardized on one type of machine, which is good business unless you are selling the equipment that is not being used. If you are in that position, that is where the airplane comes in.

My competitor was usually invited to this man's house for dinner when he called. He knew the wife and kids. They called him by his first name. He took candy to the kids, sent flowers to the wife, and had tickets for a good show in his pocket. He had the firm's business sewed up 100 per cent, and I was a nuisance.

Every salesman knows this situation, and finds it the most difficult obstacle he has to surmount. He knows that a very large percentage of sales are made on personal friendship, and that even though the purchaser treats him courteously and listens to his sales talk he will never sell him unless he can get under his skin.

At my wit's end, I decided to try an airplane. I must not take much of this man's time, for if I did he would not see me next time; he would simply send out word that he was not needing anything. So I rented an airplane and flew to the prospect's city. He was hard-boiled, and I did not dare even invite him for a ride. Of course I could not boast about being able to fly. I figured it would take me about three hours to get home, so I called about 3 o'clock to give me a good opening to mention flying.

I made my usual inquiry as to whether he was in need of any of my machines, and got the usual negative reply, although I knew he was in the market at that time. I asked him to let me submit

a proposition when next in the market, and remarked that I would run along, as I had to be in St. Louis that evening. He looked up, apparently pleased at being able to show me I was so dumb I didn't even know how far I was going, and asked how I expected to do that. "It's over 400 miles to St. Louis." I told him I had flown over that morning and could easily make it home in time for dinner. "You'll break your neck if you don't keep away from those things," he said. I asked him if he had ever been up, and he made the statement that leads this story.

At any rate I was home for dinner, and when I next called on this man instead of fussing with his papers as he usually did he looked up and asked if I had got home on schedule the last time. He asked if I flew the plane myself, and a few other of the usual questions about flying. Just a few minutes of that, and I was able to hold his interest long enough to get over a description of one or two of the most important features of our machine.

Still no orders, and at every call he promised to inspect our factory and see our machines in operation, but he never did. However, every time I called he asked a few questions about flying; generally he would light into me for some accident he had read about.

One day my 'phone rang and old Mr. Tough Nut himself announced that he was in St. Louis, had one hour to spare before train time and would come out and look at our factory if I could guarantee to get him back to the depot in time to catch his train.

It gave him about 30 minutes at the factory, he met the officials of our company and saw that we were a substantial outfit turning out a good product. He had been in St. Louis many times before and I am sure he never thought of me, my company, or our product until our little friendly conversations about flying.

Soon he let me bid on a job where our machines were especially suitable for meeting some special conditions. We got the order, and in about a year's time he had standardized on our machines. He is still very much opposed to flying and I don't mention flying to him at all, but his boy thinks I am a great fellow, and he thinks he has the finest boy in the world, and I think my machines are the best ever, and the result is very mysterious to my competitor. He probably thinks he has halitosis.

Let me cite another instance.

The largest user of machines, such as I sold bought from my competitor for reasons unknown to me. I called regularly for years and was treated courteously and that was all. I tried to get the customer to play golf with me, to go to the ball game, lunch, or anything—without success. I sent him cigars for Christmas, which he returned with thanks. It was plain that he did not want to deal with me or my company.

He was cold as ice to me and I dared not mention flying—so I got a friend of mine who was on the inside track with this gentleman to ask him if I had ever taken him up for an airplane ride. My friend pretended that he had just been up for his first ride and was all enthused about it.

The next time I called on the human iceberg himself, he said, "I understand you fly." I admitted it, and told him it was a lot of fun. He made some remarks about fools and broken necks. Nothing more developed for a time, but apparently he mentioned to his family that some fool salesman had an airplane and wanted to take him up.

Several months later when I called he surprised me by asking me to sit down and told me that he had two boys who were very much interested in airplanes and that they had made him promise to get me to explain mine to them and as he said, "let them touch it."

Naturally, I said that I would be glad to do so at any time, beginning right now. To my very great surprise he called his wife to see if she could get the boys out of school and go to the field right away. In five minutes we were headed for the field to meet them.

Any one interested in selling can imagine what had been going on in this man's home and what it meant to me.

Upon arriving at the field I found the wife as much interested as the boys and at the proper time asked them all to go up for a ride.

That was an unforeseen situation for the boss of the household, but in about two minutes his wife and boys put on a high-pressure campaign that ended by his giving them permission to go up.

I had to rent a larger plane to take them, and when we got warmed up and about ready, with the wife and boys all seated, papa came up and said he guessed he would go, too.

Needless to say, they all enjoyed it, and thereafter I was not only welcome in his office at any time, but soon was getting all his business.

I take the whole family up frequently and am on the inside track, and another competitor is probably telling his sales manager that I am crooked, that so-and-so is getting a rake-off for buying from me, or some other alibi.

Really the only difference is we are now personally acquainted. The purchaser will now explain his needs to me in detail, I can figure very closely on just what he needs to meet the conditions, he gets a product at a very reasonable price, and every one is happy except the competitor who doesn't understand the psychology of this flying business.

There are many cases where the purchaser lets me fly him around so much it might almost be considered bribery, but any sales manager who ever sold anything himself will appreciate the importance of intimate personal contacts between the salesman and purchaser.

Every salesman selling a commodity for which an average order is $1,000 or more will find it a very great advantage if he can get his customer or prospective customer to visit the factory. This is the best way to mention flying. Try to get a prospect to visit your factory. Ninety-nine out of a hundred will say "too busy—can't spare the time." Then spring the airplane on him. He can leave tomorrow morning, be back tomorrow evening, an interesting experience, bring the wife and children. Even if he won't go he will remember you when you next call, and if he mentions your offer at home and has any boys he is sunk. They will be selling you to him every evening at the dinner table.

It takes some thought to find the best uses for an airplane in any particular kind of sales-promotion work, but any sales manager who has ever put his initials on an expense account has enough imagination to devise many ways of putting the plane to work. It is by far the most effective means of creating personal interest.

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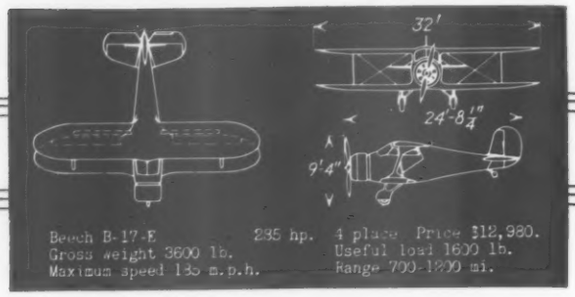
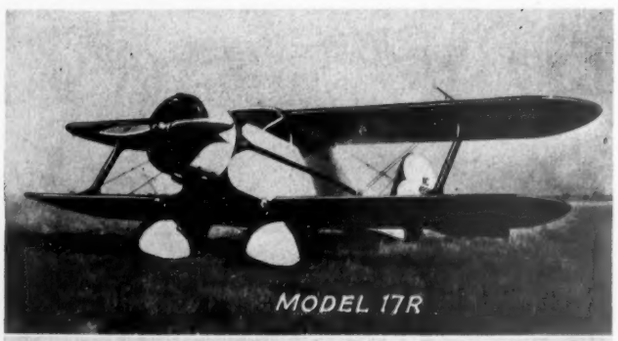
Complete comparative tabulations of dimensions, design characteristics, and performance, for the planes and engines shown and described in this section and for many others, appear on page 156 and the pages that immediately follow it.

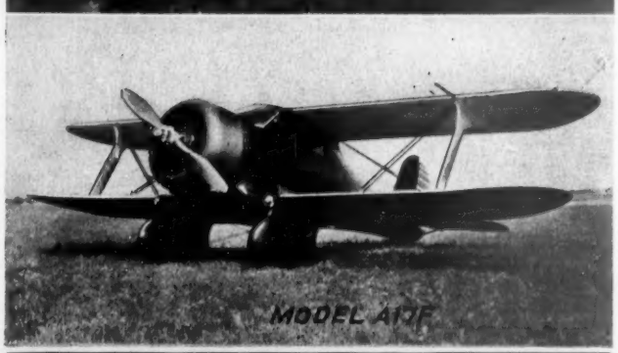
THIS is for owners of airplanes, and operators of flying services, and for all those who might and ought to become owners and would do so if the case were properly presented to them, and for all others interested. The best place to display a really good airplane is in the air, but it is convenient from time to time to get them all together in one place for comparison. Hence this exhibit on paper. Turn this leaf, and you will be in the aisles of the show. Turn it and the leaves that follow, and you will pass among the widest range of products — the most efficient and reliable and best-performing and most thoroughly tested aircraft — the best values that any industry in the world has ever been able to display.

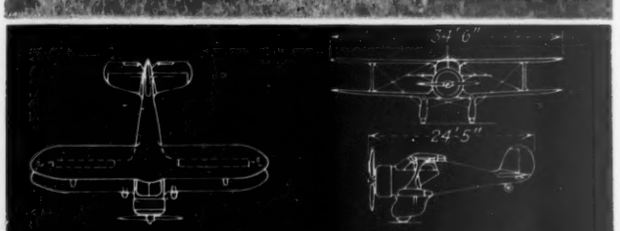
BEECH


32'
24'-8¼"
9'4"
Beech B-17-E 285 hp. 4 place Price $12,980.
Gross weight 3600 lb. Useful load 1600 lb.
Maximum speed 185 m.p.h. Range 700-1200 mi.

B-17-E







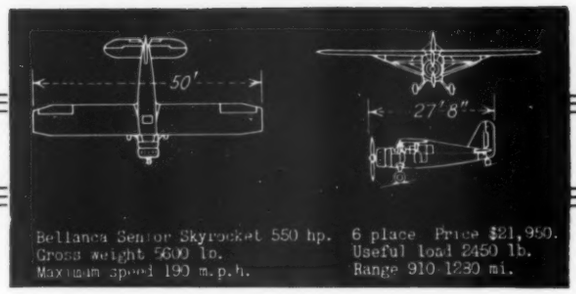
BEECHCRAFT cabin biplanes come out of Wichita as a reminder of that city's preeminence as a cradle of post-war light commercial aircraft construction and of the leading part that Walter Beech played in the development of Wichita's aircraft industry.

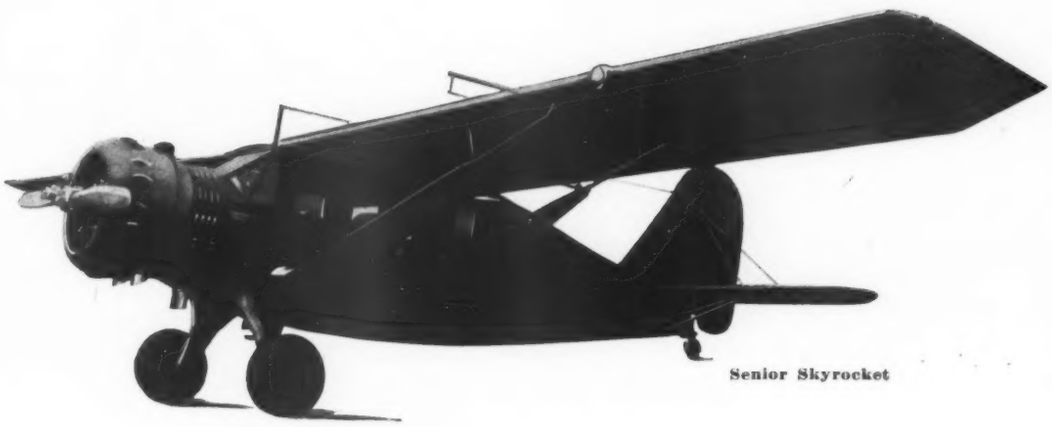
For three years Mr. Beech has been building planes under his own name, conspicuous in appearance for negative stagger and (in some models) retractable landing gear. The first of the line was flown on Nov. 6, 1932, and new designs and changes in detail have been frequent since that date. Beechcraft come now in from four- to five-passenger capacity, and engines from the Jacobs 225 to the Cyclone 690 hp.

The structure is of steel throughout, including the wings, and the design shows a special concern for aero-dynamic cleanness and high performance, even to the use of a curved windshield. Where landing gears are not retractable they are fully streamlined, and made to serve as a point of anchorage for flying wires to give an improved bracing angle. Flaps for landing speed reduction and a steeper gliding angle are standard on all models. Stabilizers are fixed and longitudinal trim is maintained by the use of tabs in the elevator surfaces.

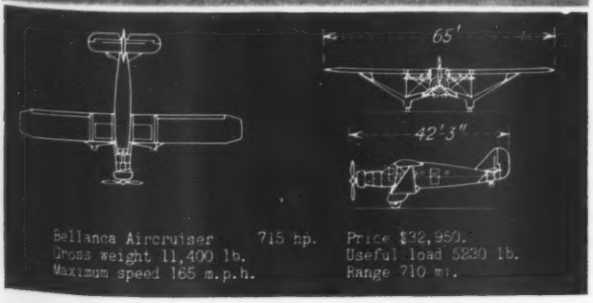
The performance data for two of the models are given on the drawings. The third, photographically illustrated, with 420 hp. engine, is of 4,500 lb. gross weight, carries a useful load of 1,800 lb., makes 195 m.p.h.

BELLANCA





Senior Skyrocket

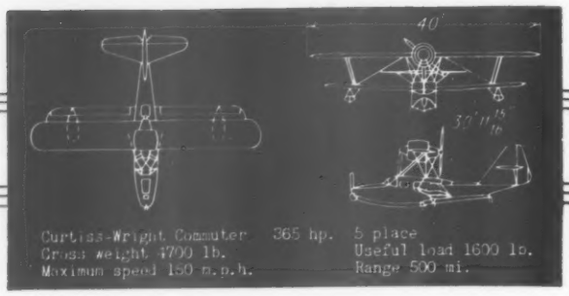


BELLANCA monoplanes have been making their reputation with the public at large for a number of years on record-breaking flights, including several across the Atlantic. A duration record of 84 hours and 33 minutes, established four years ago, still stands. At the same time they have established themselves in a more restricted circle as light transports and for general commercial service, as well as for those private owners who want planes as large as those on which the company has specialized.

The Senior Skyrocket is designed to the general formula originated by G. M. Bellanca more than a dozen years ago, a high-wing monoplane with external bracing by struts broad enough to make a useful addition to the lift. The Aircruiser follows a somewhat similar pattern, though with struts broadened to a lower wing, and is offered both in the single-engine form here shown, and with two Wright Cyclones of 715 hp. each, and a maximum speed of 190 m.p.h. The wings of the Aircruiser combine spruce with spot-welded stainless-steel ribs. Wing flaps bring the landing speed of the two-engined model to below 60 m.p h. in spite of a wing load of over 20 lb. per sq.ft.

The Bellanca Swoop is of radically different form. A specialized design developed for Major Fitzmaurice to use in last year's MacRobertson race, it has retractable landing gear, speed of better than 250 m.p.h., at 9,000 ft., with a twin-row Pratt & Whitney engine giving 750 hp. at that altitude, 3,000 mile range.

CURTISS-WRIGHT


40
32'11 15/16"
Curtiss-Wright Commuter 365 hp. 5 place
Gross weight 4700 lb. Useful load 1600 lb.
Maximum speed 150 m.p.h. Range 500 mi.

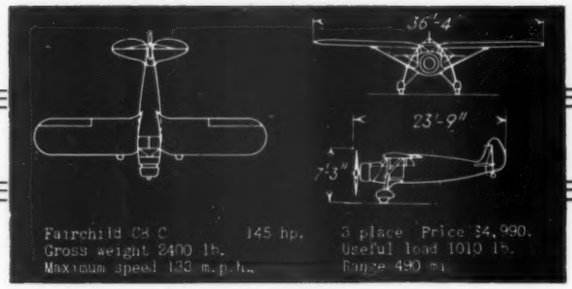
Commuter

AIRPLANE manufacture under the flag of Curtiss-Wright has for six years been divided between two plants, with military production cared for in Buffalo and the commercial line in St. Louis. The commercial designs of the past few years have ranged from two-passenger capacity to twenty, and from 40 to 1,400 hp. The range of products now offered to the market is slightly more restricted at the lower end, the smallest of the present list being the Sport of three-passenger capacity, 29-ft. span, and 175 hp. Next in line is the Speedwing, a three-seater with various Wright Whirlwind engines of from 250 to 420 hp., and a top speed varying in accordance with power from 155 to 185 m.p.h.

The giant of the Curtiss-Wright family is now, as for a number of years past in its various successive forms, the Condor transport. Though a variety of interior arrangements have been used in the Condor, its standard capacity is fifteen passengers and two pilots, with two Cyclone engines turning up a total of 1,420 hp., a gross weight of 17,500 lb. and a span of 82 ft. The wing loading is far below the usual transport practice—notwithstanding the maximum speed of 190 m.p.h. at 8,000 ft. Condor wings are fabric-covered, but the interior structure is all-metallic-welded steel spars and duralumin ribs, fuselage of steel tubing.

Completely new in 1935 is the five-passenger amphibian with Whirlwind engine, designed primarily to serve the sportsman, and remarkable for wheels behind the center of gravity and extra wheel at the nose instead of the tail.

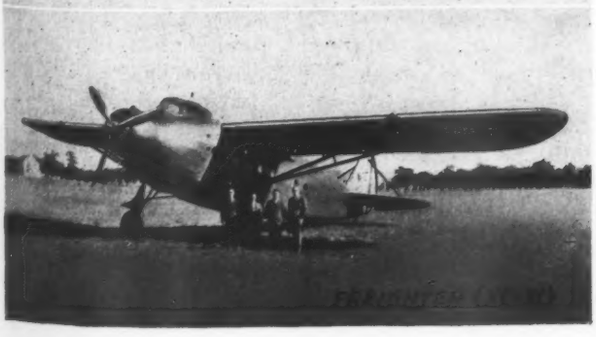
FAIRCHILD


36'-4"
23'-9"
7'-3"
Fairchild C8 C 145 hp. 3 place Price $4,990.
Gross weight 2400 lb. Useful load 1010 lb.
Maximum speed 133 m.p.h. Range 490 mi.

Ranger 24 (C8-D)

WARNER 24 (C8-C)

WARNER 22 (C7-G)

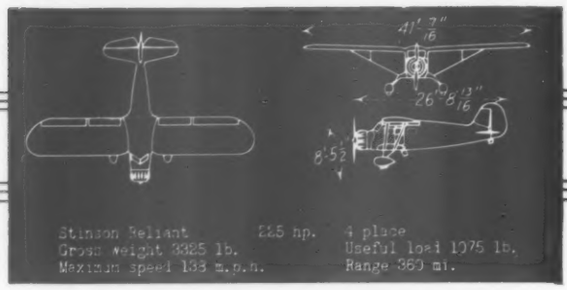


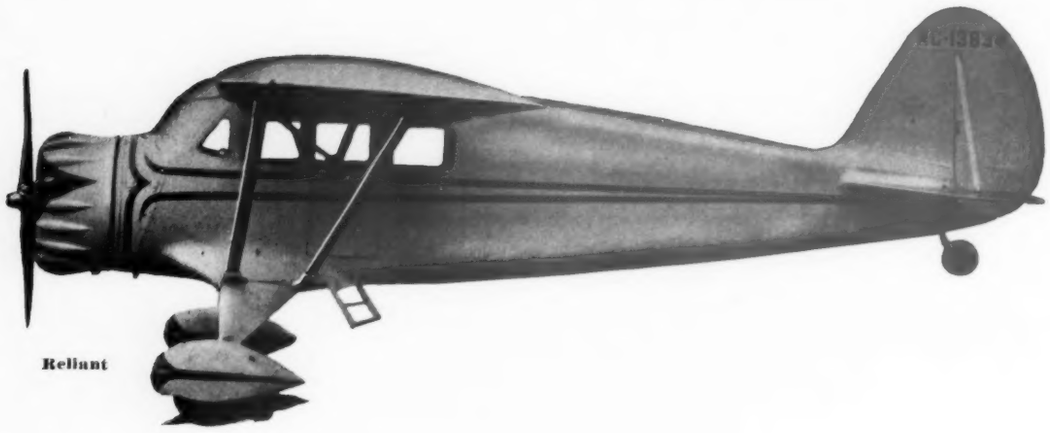
SINCE inaugurating its present general line of production, the Fairchild company has given primary attention to the needs of the private or industrial user who does his flying alone or with a single companion, or two at most, and machines for that market continue to take a leading place in the Fairchild line. They come in both open and cabin forms, the former with a 90-hp. Wright Gypsy as standard power plant; the latter, which is made in either two or three-passenger seating arrangement, with a Fairchild Ranger engine or the Warner Super Scarab of 145. The demand for open and cabin types has been even enough to keep the market closely divided between the two during the past season.

The open model with its lower power has approximately 20 m.p.h. less speed than the cabin type, and about 2,000 ft. less ceiling and a third less range. The overall dimensions of the two two-seaters are very much the same, the three-seater having some 3 ft. more span and 10 per cent more wing area. The construction is the conventional combination of wooden wing and steel-tube fuselage. Seating in the cabin models is side by side with dual controls (the third seat, where there is one, is in the rear).

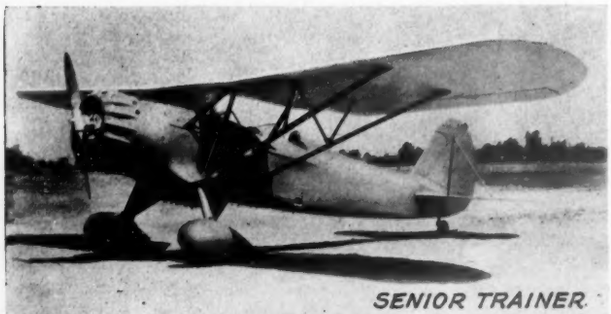
Other Fairchild models, new in the present year, are the five-passenger low-wing monoplane, with a top speed of 168 m.p.h. from a 225 Jacobs engine and a retractable landing gear, a large-capacity moderate-speed single-engine freighter, originally developed for the Army and a single-engined amphibian building for Pan American.

STINSON



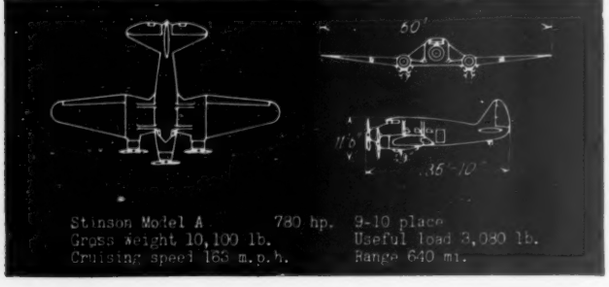


Reliant



SENIOR TRAINER

AIRLINER

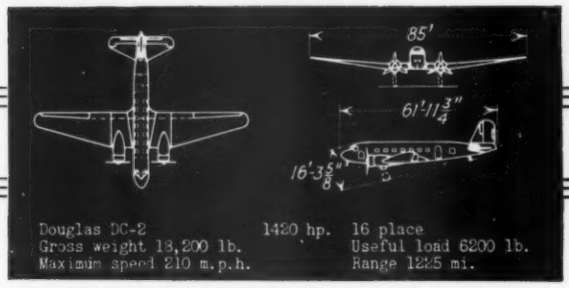


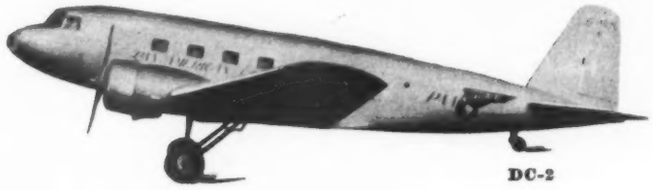
DURING more than six years in which Stinson has been building four-passenger cabin monoplanes there has been no great or sudden modification in the type, but a steady evolution. Of the various models, several hundred are now in service. The latest of them is like all its predecessors in having a high wing with strut bracing. Its landing gear is of the full cantilever type and notable for its simplicity. The structure resembles that of most other light commercial planes of American manufacture in embodying a welded steel tube fuselage, but it introduces an individual and somewhat unusual element in combining spruce spars with light-alloy ribs. Wing flaps are standard.

The Stinson company has been as faithful to the tri-motor transport as to the medium-sized monoplane for private ownership. The 1935 Airliner, with three Lycoming engines rated at 260 hp. each, differs in structural material from the four-passenger Reliant in having welded steel spars instead of wooden ones. The landing gear is retractable by electric power. Payload allows for eight passengers and 500 lb. baggage or mail.

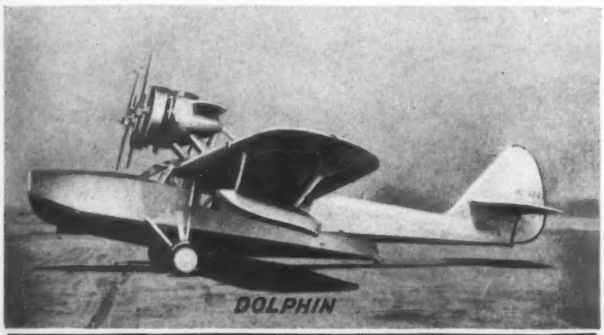
The most novel item on the list is an open-cockpit parasol type training plane with Lycoming engine, a 126-mile speed and 400-mile range. The general type of structure is similar to that of the Reliant, and the wing is of almost the same size.

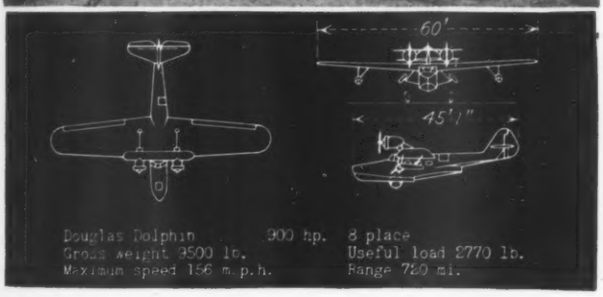
DOUGLAS





DC-2

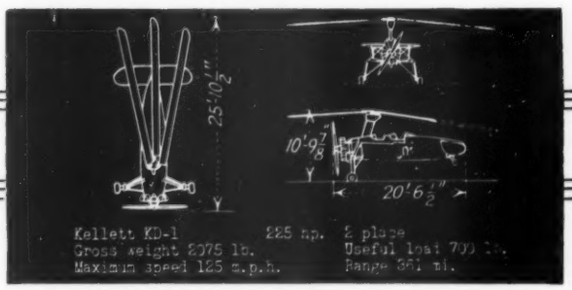




THE LEADER of the Douglas showing, by the test of numbers produced or of reputation gained, is the twin-engined transport, DC-2, of which almost 100 are now traveling the airways of the world. Its fourteen-passenger sound-proofed cabin and its performance are known wherever airplanes fly. The structure, like that of most recent transports, and military planes, as well, is light-alloy monocoque with stressed-skin wing. The material is Alclad, to furnish corrosion-proofing without protective coating. Engines are Wright Cyclones or Pratt & Whitney Hornets.

Twin-engined, also, is the Dolphin, but in that case the wings are of wooden structure and with a plywood skin. It is available either as flying boat or straight amphibian, with a 600 lb. difference in empty weight between the two and a corresponding change in useful load.

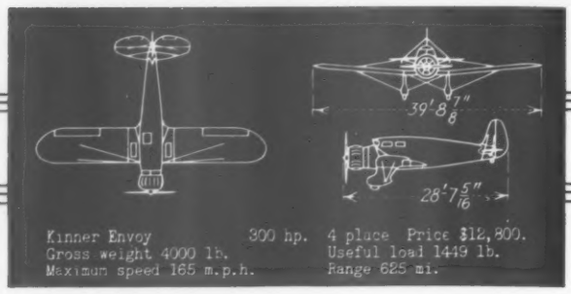
KELLETT



KD-1

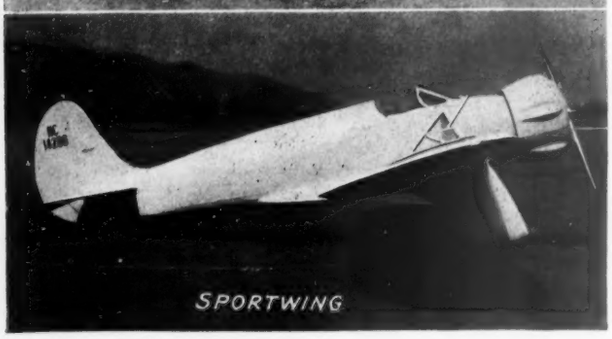
THE KELLETT autogiro has recently shed its wings, taking new direct control forms. Rotor pylon has been streamlined, many external wires eliminated. Improved performance and improved handling result. With a folding rotor, the machine needs little more than garage space for storage.

KINNER



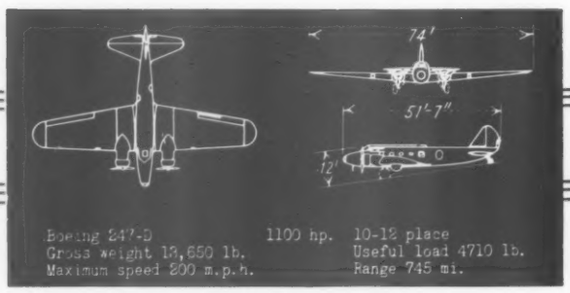
Kinner Envoy 300 hp. 4 place Price $12,800.
Gross weight 4000 lb. Useful load 1449 lb.
Maximum speed 165 m.p.h. Range 625 mi.

Envoy



KINNER has, for many years, built both engines and airplanes within a single manufacturing organization. The planes themselves spread over a wide range, five models being offered. In the open class, the Sportster, in two forms, one with 100 hp. engine, the other with 125 hp. (not illustrated) and the Sportwing (125 hp.) are available. Cabin ships include the Playboy (160 hp.) and the Envoy—a four-place ship with 400 hp. Performances range from a top of 104 m.p.h. with the 100-hp. Sportster up to 165 m.p.h. for the Envoy. The cabin four-seater has a 625 mile cruising range, rather more than an ordinary figure for that category. All models, even the small ones, are fitted with tab control on the elevators for longitudinal trim.

BOEING

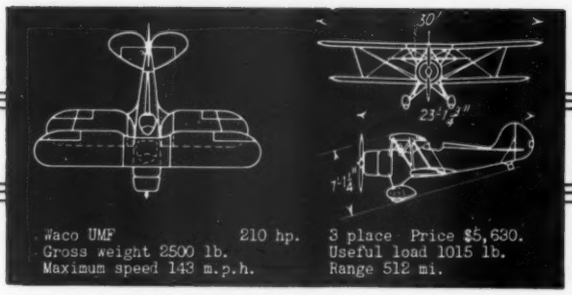


Boeing 247-D 1100 hp. 10-12 place
Gross weight 13,650 lb. Useful load 4710 lb.
Maximum speed 200 m.p.h. Range 745 mi.

247-D

PIONEER twin-engined transport monoplane, with nearly two years of intensive service on the airlines now behind it, is the Boeing 247. Redesigned as the 247D, with SIHIG Wasp engines, performance (one or two engines) has been increased, passenger comfort improved, cruising speed raised nearly 20 m.p.h.

WACO



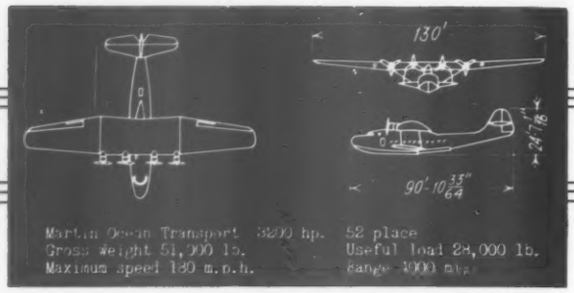
Custom Cabin

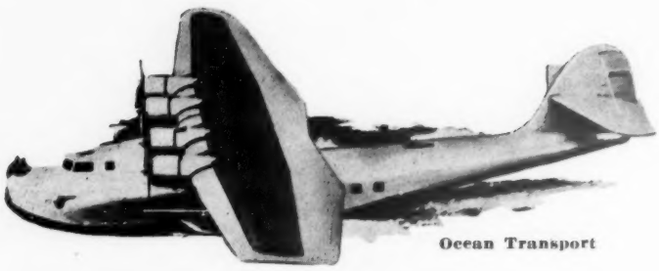
FOLLOWING almost a dozen pioneering years of building open biplanes, the Waco Aircraft Company branched out into four-passenger cabin biplanes, a ship that has had wide acceptance. The 1935 Waco standard cabin now appears in three models. Two are identical except for the alternative provision of a Continental 210 hp. engine, or a Jacobs 225. The third, with 10 per cent more wing area and some 6 miles more speed (147 m.p.h. top), mounts a 250 hp. Wright, and has a cruising range of 580 miles, the other models running about 500.

The custom model cabin, new this year, appears with the same arrangement of engine and substantially the same wing area, but about 12 to 15 miles more speed. The gross weight of all the cabin models is around 3,000 lb., and all use the patented Waco splined sliding landing gear.

For those who prefer to fly in the open, there is the Model F, again with a choice of Continental or Jacobs engines. The range is of the same order as in the standard cabin models, with speed and ceiling higher by about 5 miles and 1,500 ft., respectively. The last item on the list is a two-passenger biplane with removable cockpit enclosure, the Model D, with a 400 hp. Pratt & Whitney Wasp, Jr., engine pulling it along at 195 m.p.h. and up to 21,000 ft. altitude. The structure, like that of all the other Wacos, is of spruce in the wing and welded chrome molybdenum steel tubing in the fuselage.

MARTIN

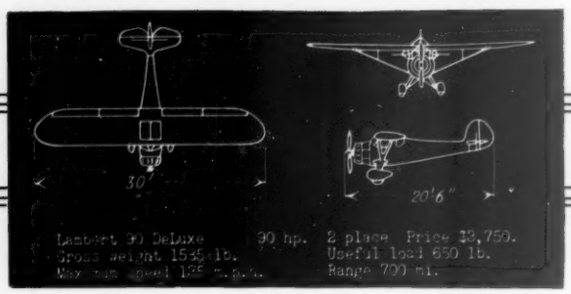

130'
90'-10 33/64"
24'7 1/8"
Martin Ocean Transport 3200 hp. 52 place
Gross weight 51,000 lb. Useful load 28,000 lb.
Maximum speed 180 m.p.h. Range 3000 mi.



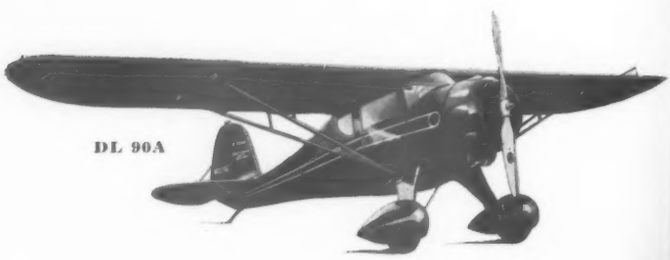
Ocean Transport

SPECIALISTS in large airplanes, the Martin Company has produced the largest yet in a four-engined P&W twin row transport. Biggest American seaplane, it nears readiness to carry passengers across the Pacific. First American design to substitute "sea wings" for the usual wing-tip floats.

LAMBERT

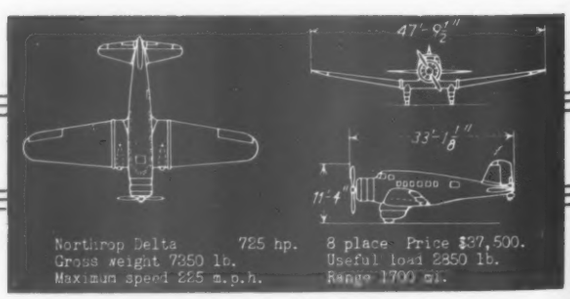

30'
20'6"
Lambert 90 DeLuxe 90 hp. 2 place Price $3,750.
Gross weight 1545 lb. Useful load 650 lb.
Max cruising speed 125 m.p.h. Range 700 mi.

PIONEER among fast cabin two-seaters, the Monocoupe is now available in the older Models 125 and D-145 (with Warner power), or in the current production Model 90, with Lambert R-266 engine. De Luxe 90A offers extra performance from improved cowling and addition of trailing-edge flaps.



DL 90A

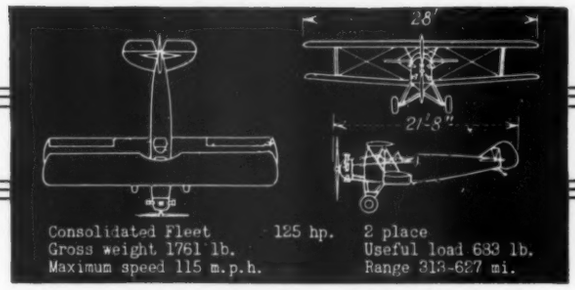
NORTHROP


47'-9 1/2"
33'-1 1/8"
11'-4"
Northrop Delta 725 hp. 8 place Price $37,500.
Gross weight 7350 lb. Useful load 2850 lb.
Maximum speed 225 m.p.h. Range 1700 mi.

Delta

IN WIDESPREAD transport and industrial usage, the current Northrops adhere to the distinctive metal monocoque fuselage and stressed-skin multi-spar wing construction, to streamlined landing gears. Among the first to adopt wing flaps, Northrop continues their use on production models.

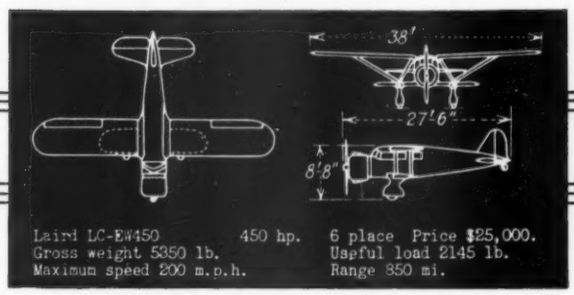
CONSOLIDATED



Fleet

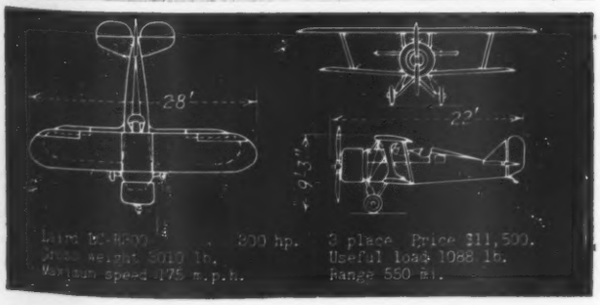
FLEET two-seaters, backed by many years of the harsh testing that aviation cadets can give to military trainers, are fitted with 125 hp. or 160 hp. Kinner engines respectively. Maximum speeds differ by 10 m.p.h. The PT-11C, a larger and heavier two-place trainer not here shown, develops 132 m.p.h. top speed from a 250 hp. Whirlwind.

LAIRD


38'
27'6"
8'8"
Laird LC-EW450 450 hp. 6 place Price $25,000.
Gross weight 5350 lb. Useful load 2145 lb.
Maximum speed 200 m.p.h. Range 850 mi.

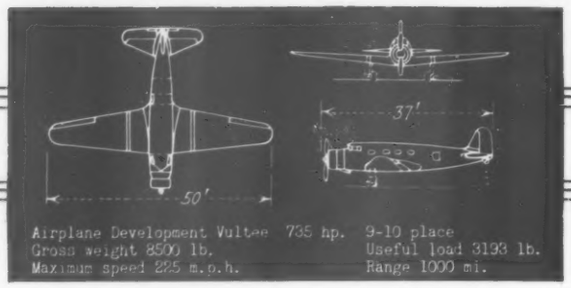
LC-EW450

MODEL LC-R300



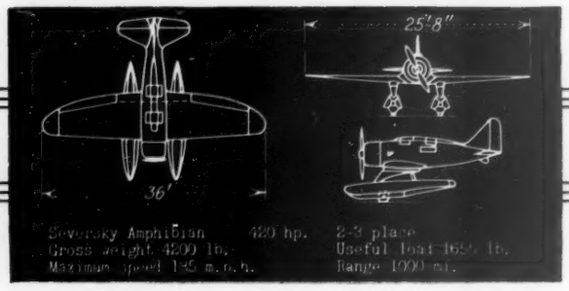
SINCE the appearance of the first Laird Swallow just after the War, the name has played a constant part in the aeronautical industry. In recent years and at the present time it stands for custom-built airplanes or machines put in small production for specialized service. The latest design is a six-passenger cabin machine with a top speed of 200 m.p.h., flaps to cut down the landing speed, and a duralumin monocoque fuselage—the last a somewhat unusual feature in a machine of this size. The open biplanes, both two and three-passenger, also depart from the customary standards in structure in having the fuselage framing of light-alloy tubing. The two-passenger machine with a Wasp engine does 190 m.p.h. at 5,000 ft. Cruising radii are generous, 850 miles for the cabin machine, 600 to 700 miles for open models.

AIRPLANE DEVELOPMENT


37'
50'
Airplane Development Vultee 735 hp. 9-10 place
Gross weight 8500 lb. Useful load 3193 lb.
Maximum speed 225 m.p.h. Range 1000 mi.

Vultee V-1

OF THE single-engined low-wing monocoque transports of recent origin, the Vultee V-1 is the largest. Its designer has been responsible for a series of high-performance airplanes during the last ten years. Striking features are careful cabin sound-proofing, simplicity and directness of the retracting gear.

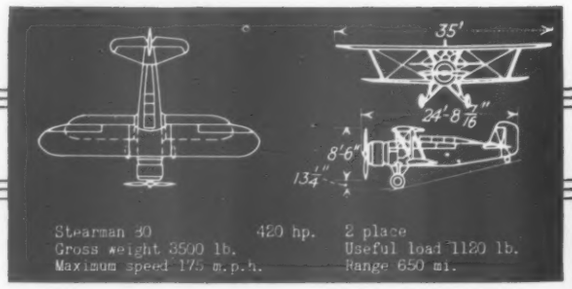


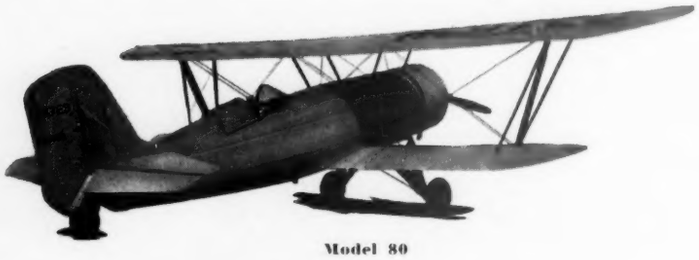
SEVERSKY

A HIGH performance, multi-purpose type is offered in the SEV-3M. All-metal construction includes full monocoque fuselage, multiple box-spar wing with stressed dural skin. Notable for novel type amphibian gear with semi-retractable floats, with landing wheels projecting through openings in the vee bottoms.

SEV-3M

STEARMAN

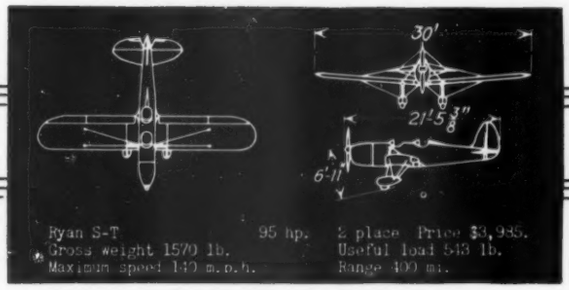


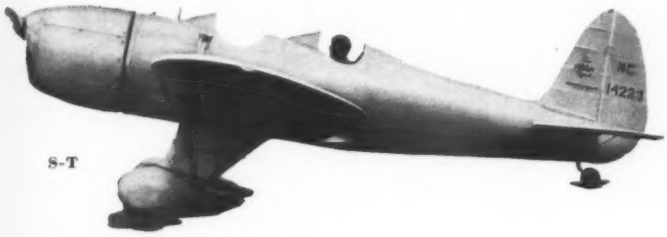


Model 80

ONLY non-military model offered is a conventional single-bay biplane for two. Clean lines and 420 hp. from a TB Wasp Jr. net a high maximum speed. Notable feature: a combination wire-braced landing gear with streamlined wheels. Forward cockpit covered gives higher performance as single seater.

RYAN

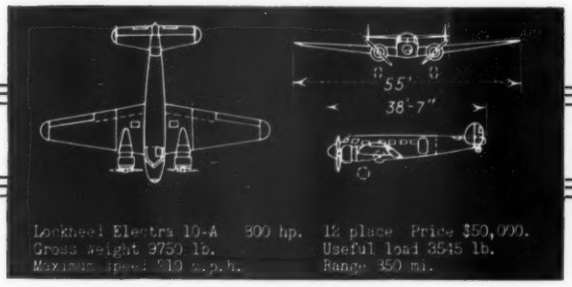




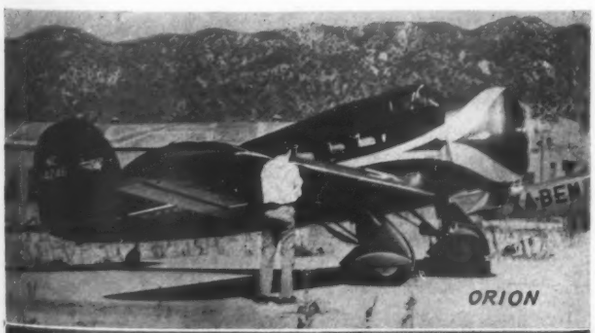
S-T

DISTINGUISHED by departure from the conventional in usage of materials, the new Ryan S-T combines a cleancut all-metal monocoque fuselage with fabric-covered wings framed with spruce spars, dural ribs. Powered by Menasco, the S-T offers the private owner performance for low power.

LOCKHEED

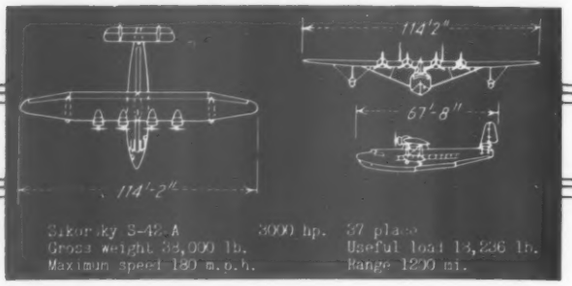

55'
38'-7"
Lockheed Electra 10-A 300 hp. 12 place Price $50,000.
Gross weight 9750 lb. Useful load 3545 lb.
Maximum speed 210 m.p.h. Range 350 mi.

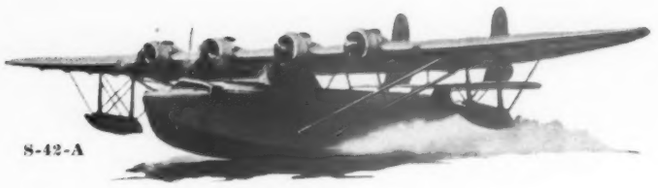
Electra



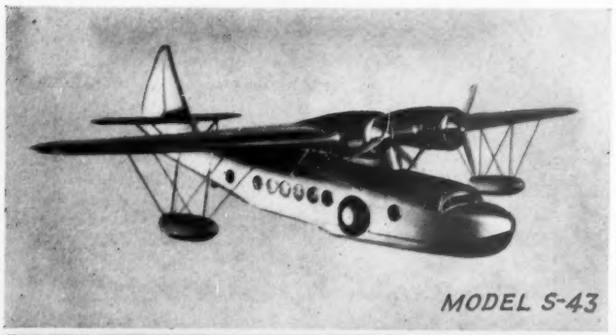
IN THE YEARS when the use of monocoque structure, cantilever wings, and a smooth elliptical fuselage section were almost unique, the name of Lockheed came to symbolize the type. Single-engined Vega, Orion and Altair continue as Lockheed offerings, all giving speeds in the 200-mile region, but the special concentration now is in the transport field, for which the Electra was designed and for which it has been purchased by a number of airlines both within and without American boundaries. With electrically-operated retractable landing gear to help at one end of the speed range and flaps to help at the other, the Electra gives its performance with but 80 hp. per paying passenger. As in most other recent transports, the general structure is Alclad monocoque throughout. Engines are Pratt & Whitney Wasp Jrs. or, alternatively, Wright Whirlwinds.

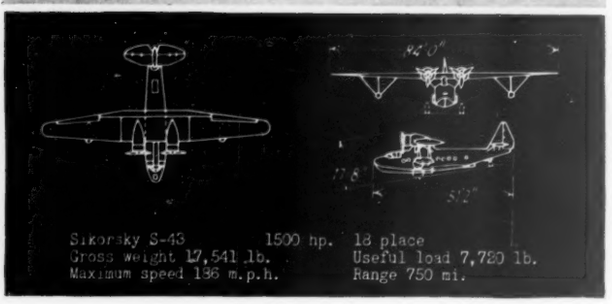
SIKORSKY


114'2"
67'-8"
114'-2"
Sikorsky S-42-A 3000 hp. 37 place
Gross weight 38,000 lb. Useful load 14,236 lb.
Maximum speed 180 m.p.h. Range 1200 mi.



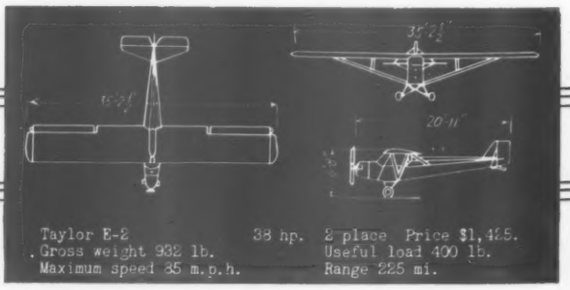
S-42-A





FOR many years the name Sikorsky has been associated with the design of large airplanes, particularly flying boats and amphibians. Step by step, Sikorsky production models have advanced in size, performance, from S-38, through S-40 (first of the PAA Clippers) to the current S-42 and S-43. The former, of which three out of a total of seven have been delivered to Pan American, is a four-engined flying boat for long range, overseas work. The hull is of aluminum alloy throughout, wing and tail surfaces are dural framed, part dural and part fabric covered. The S-43 is an amphibian (or flying boat, without landing gear) of smaller dimensions, but similar in general form and type of construction to S-42. The engines in both cases are Hornets. Both S-42 and S-43 show high useful to gross load ratios—some 48 and 44 per cent, respectively.

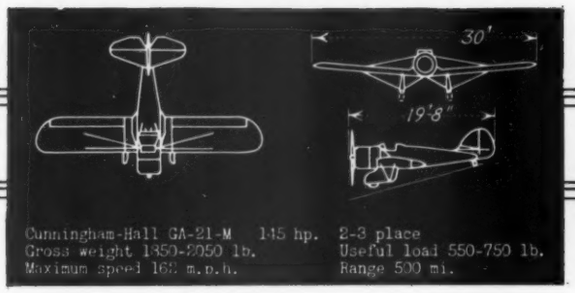
TAYLOR



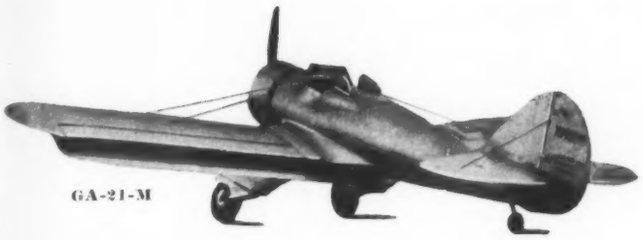
Cub E-2

THREE versions of the Cub are offered, all substantially alike as to structure and form, but differing in power plant—Szekely at 35 hp.; Continental at 38 hp.; Aeromarine at 40 hp.—cockpits normally open, but winter enclosures available as an extra. Structurally conventional.

CUNNINGHAM-HALL

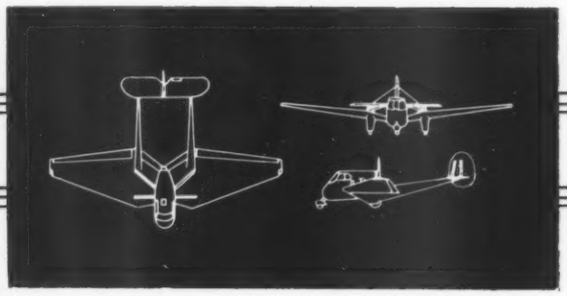


Cunningham-Hall GA-21-M 145 hp. 2-3 place
Gross weight 1850-2050 lb. Useful load 550-750 lb.
Maximum speed 162 m.p.h. Range 500 mi.



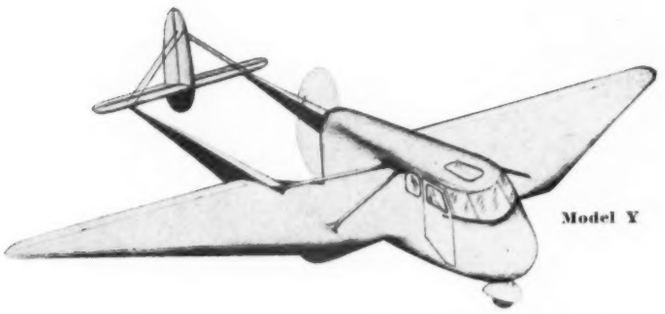
GA-21-M

ALL-METAL construction, with steel wing spars and a dural monocoque fuselage, and a new type of variable-lift wing to cut the minimum speed much more than a plain flap would allow are the most distinctive features of the new Cunningham-Hall product. The landing gear is semi-retractable.



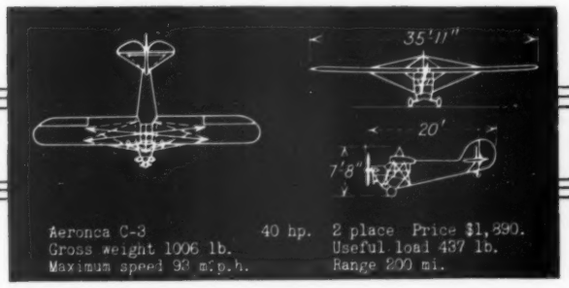
HAMMOND

WINNER of the late D. of C. design competition, the Hammond Y is a thoroughly unconventional type with unusual performance possibilities predicted for it. Side by side seating for two, wide angle of vision and three-wheeled landing gear are attractive features for the private owner.



Model Y

AERONAUTICAL CORPORATION

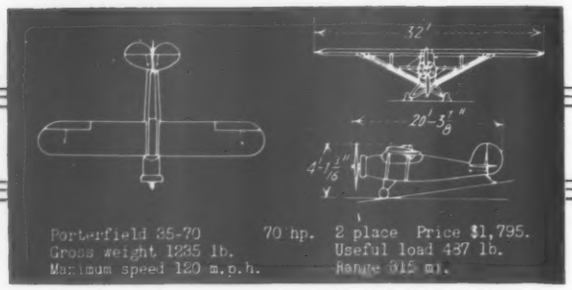


Aeronca C-3 40 hp. 2 place Price $1,390.
Gross weight 1006 lb. Useful load 437 lb.
Maximum speed 93 m.p.h. Range 200 mi.

Aeronca C-3

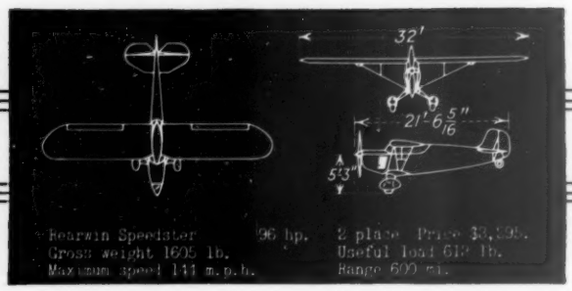
WITH more than 200 machines of the same general class built in the last five years, the Aeronca has a longer record of continuous production than any other light plane. It is available either as a landplane or seaplane. Current production models are powered with a two-cylinder Aeronca engine of 40 hp.

PORTERFIELD


32'
29'-3 3/8"
4'-1 1/16"
Porterfield 35-70 70 hp. 2 place Price $1,795.
Gross weight 1235 lb. Useful load 437 lb.
Maximum speed 120 m.p.h. Range 615 mi.

Model 35-70

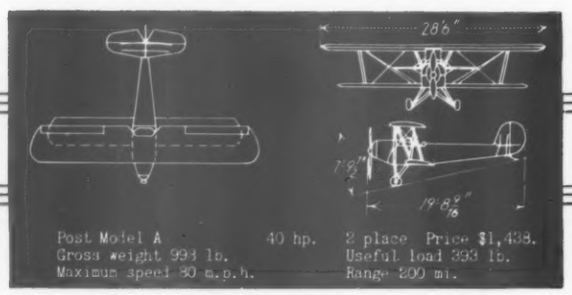
THE Porterfield two-place tandem cabin monoplane is designed to take either the 60 hp. Velie, or the 70 hp. LeBlond engine. With the latter it will cruise at 105 m.p.h. for 300 miles. Large windows and a transparent panel in the wing provide good vision for pilots.


32'
21'-6 5/16"
5'-3"
Rearwin Speedster 96 hp. 2 place Price $3,335.
Gross weight 1605 lb. Useful load 612 lb.
Maximum speed 141 m.p.h. Range 600 mi.

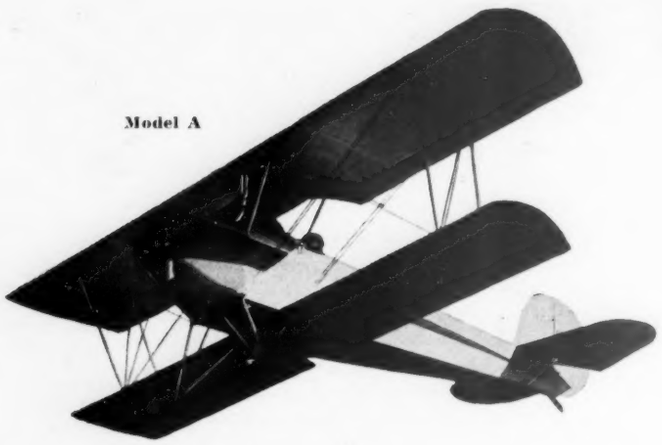
REARWIN

BESIDES the Speedster illustrated, Rearwin offers the Junior, two-place open cockpit (with optional winter enclosure) monoplane powered with three-cylinder, 50 hp. Aeromarine engine. A newer machine (Model 7000) is a cabin type for two, with LeBlond engine of 70 hp. Construction and materials are conventional.

Speedster

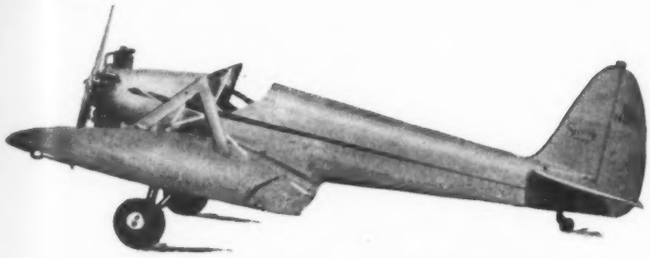


WILEY POST



Model A

OUT of all past efforts to apply automobile engines to aircraft, the Wiley Post A is the sole commercial offering today. Its modified Ford engine (AL-1000) is the only liquid-cooled power plant now available for private use. A normal biplane of conventional construction.



SECURITY-NATIONAL Aircraft Corporation offers the two-place Sportster powered with a Security S-5 engine of 120 hp. Seaplane arrangement is also available.

THE FAMILIAR Great Lakes Trainer now appears in a single model, the 2T-1A powered with an upright A.C.E. Cirrus four-cylinder engine of 100 hp.

BUILT ORIGINALLY for the McRobertson Race, the Model Q.E.D. by Granville, Miller and DeLackner is available for high performance sports use.

OF CONVENTIONAL TYPE and construction, the B-8 Kitty Hawk three-place biplane powered with a B-5 Kinner is presented by the Viking Flying Boat Company.

IN THE LIGHT PLANE category, American Eagle-Lincoln Aircraft Company lists the B-32 Eaglet, for two people, powered with the 45 hp. three-cylinder Szekely.

PIONEER DESIGNER for the home builder, International Aircraft Corporation also offers three factory-built models powered with Heath and Continental engines.

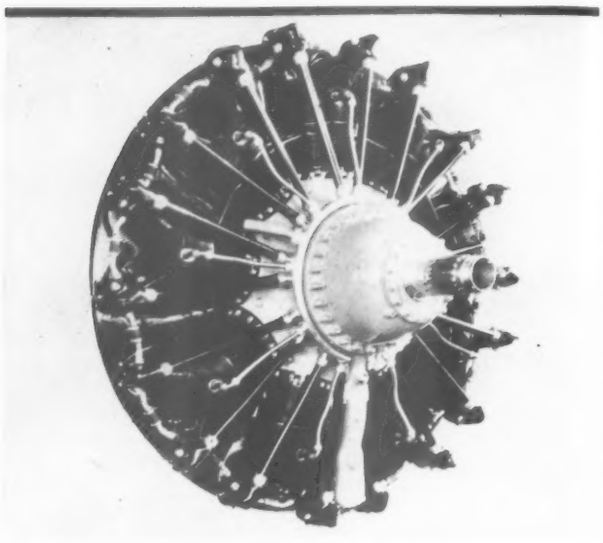
AIRCRAFT MECHANICS, Inc., offers two versions of the Flyabout, one Continental, one Szekely-powered. The Model A14 biplane (Whirlwind) is also available.

CESSNA comes to the 1935 market with a cleancut cantilever monoplane for four, powered with a Warner 145-hp. Super Scarab. Flaps are standard equipment.

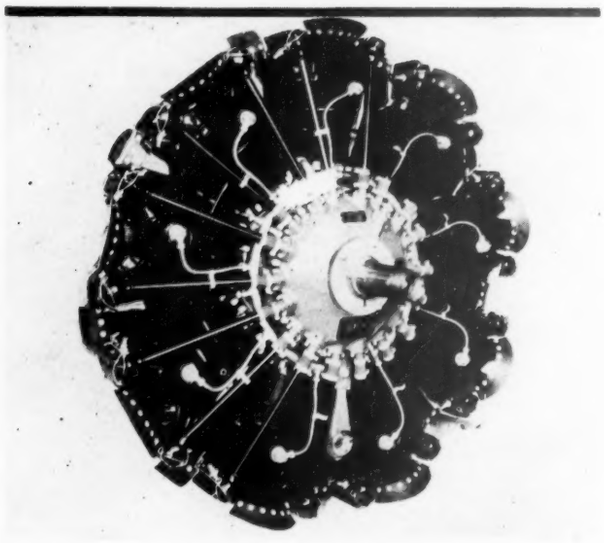
FOR FIFTEEN YEARS Burnelli designs have been built around the broad airfoil type fuselage. Latest model is all metal, powered with two P&W Hornets.

Representative American Engines

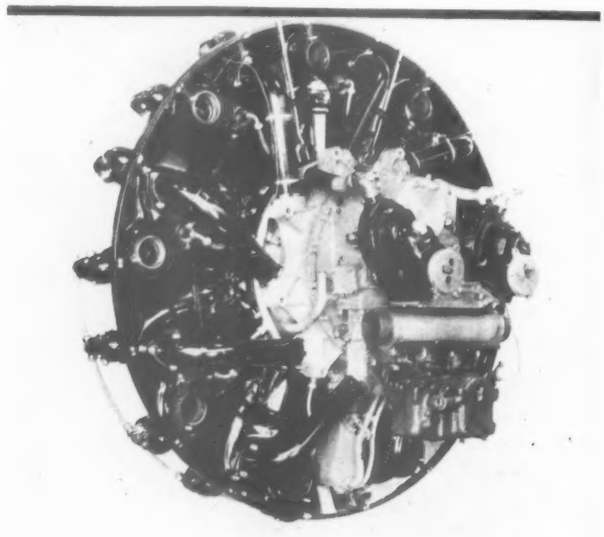
The variety of the airplanes on display in these pages necessarily depends on the engine builder, for no airplane is built until there is an engine to go into it. The designer or the private purchaser with ideas of his own now finds himself presented a bill-of-fare covering half a dozen different cylinder arrangements and powers ranging from a good-sized motorcycle's to a good-sized locomotive's. A representative, but only a fractional, selection of the engine-making industry's 1935 offerings are displayed upon this page. An enormously greater number and variety are covered in detail by the tabulation on pages 160 and 161.



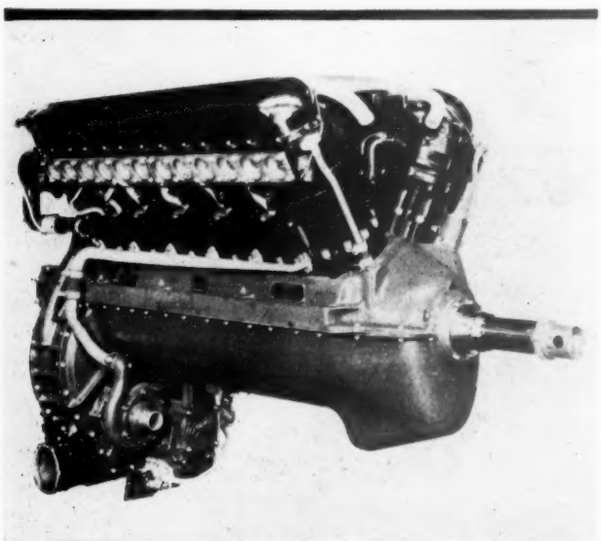
Geared Hornet (Pratt & Whitney Aircraft Company)



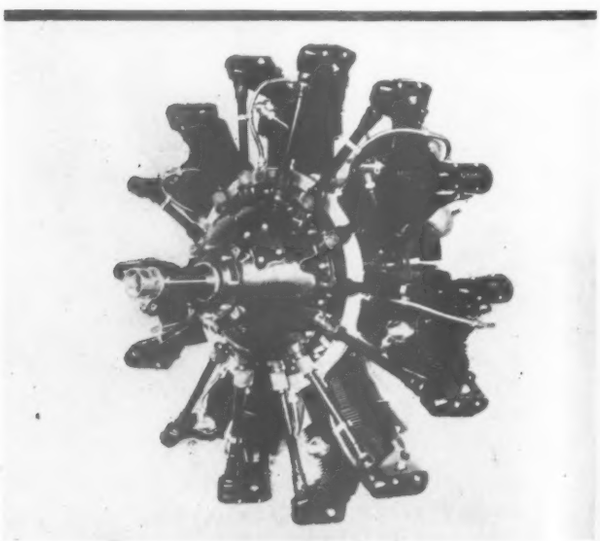
Cyclone (Wright Aeronautical Corporation)



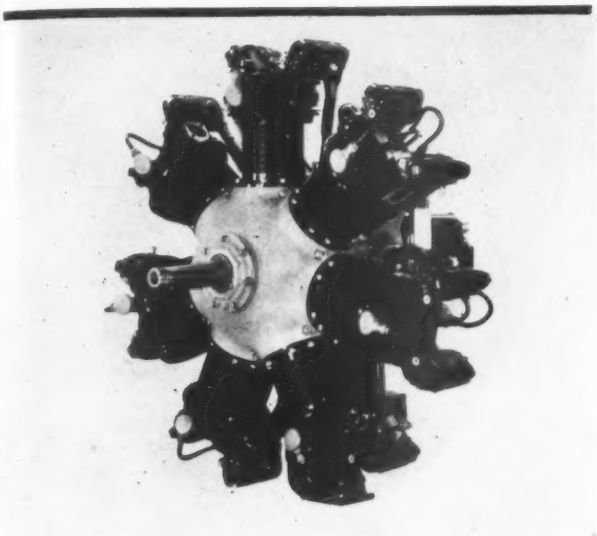
Geared Wasp (Pratt & Whitney Aircraft Company)



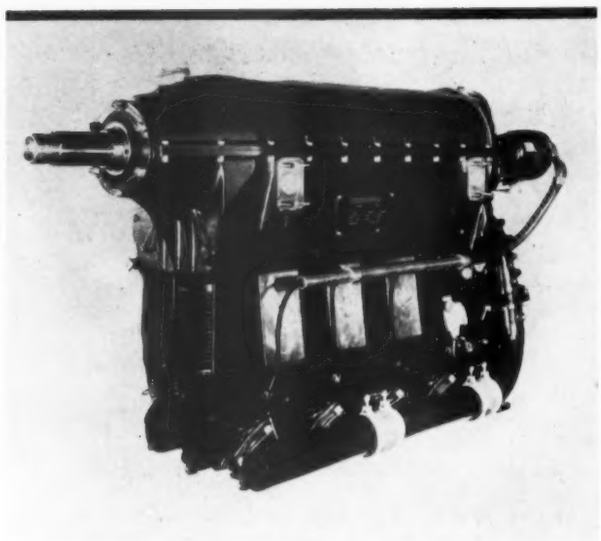
Curtiss Super Conqueror (Wright Aeronautical Corporation)



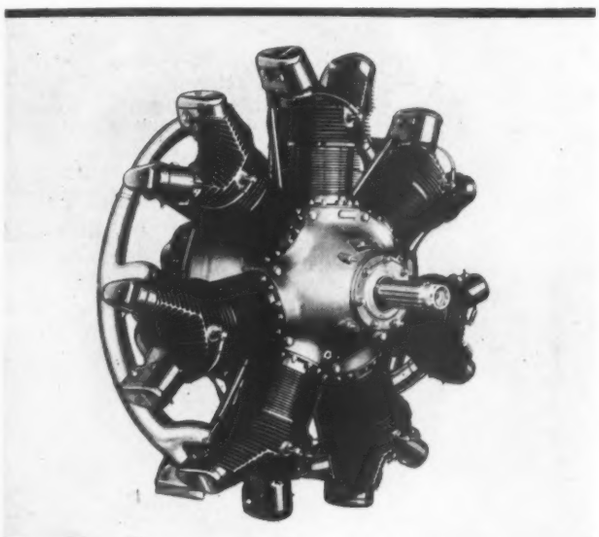
Jacobs L4 (Jacobs Aircraft Engine Company)



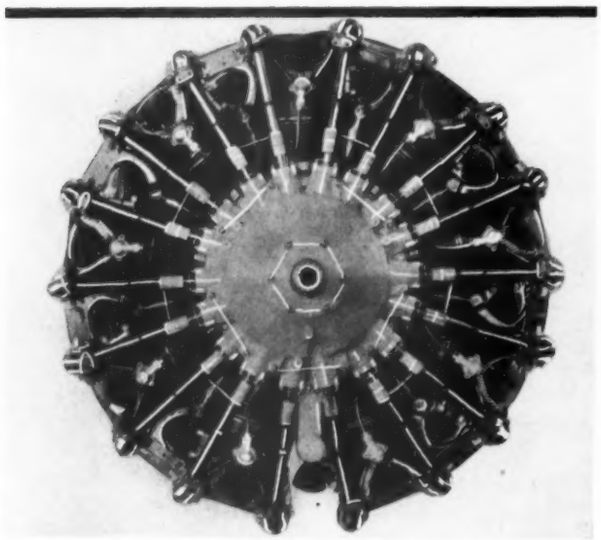
Scarab (Warner Aircraft Corporation)



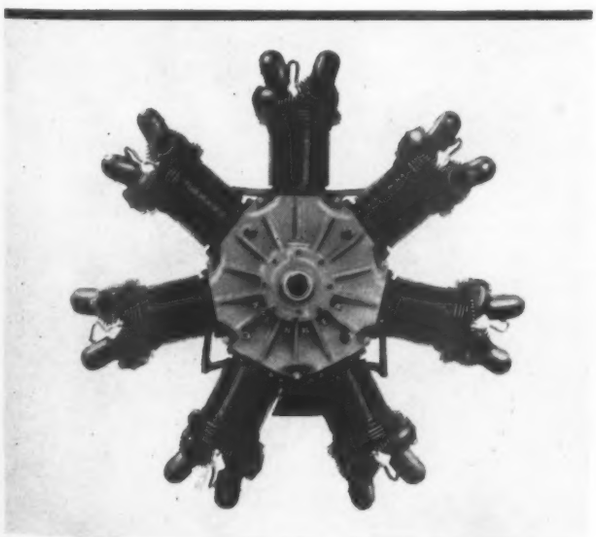
Pirate (Menasco Manufacturing Company)



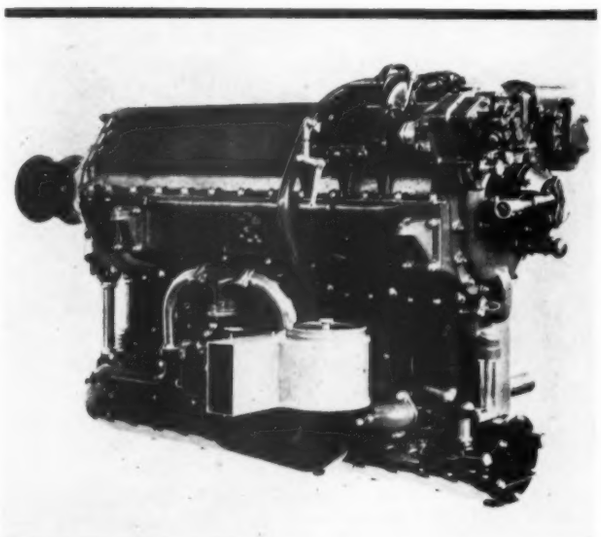
Continental R670 (Continental Aircraft Engine Company)



Lycoming R-680-4 (Lycoming Manufacturing Company)



Kinner C-7 (Kinner Airplane & Motor Corporation)

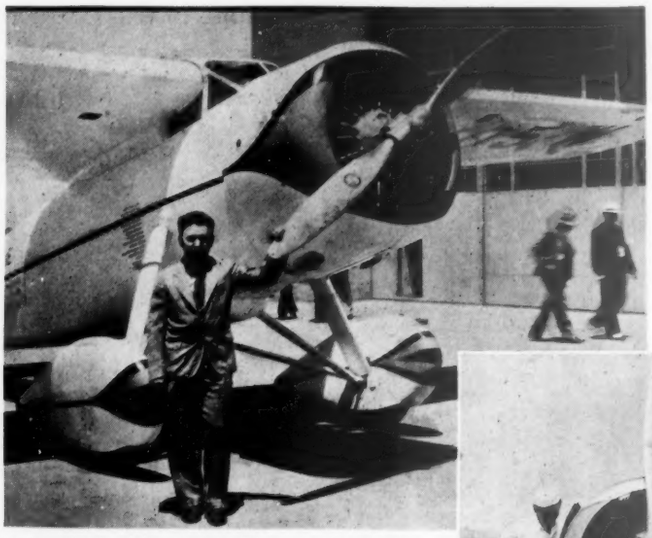


Ranger (Ranger Engineering Corporation)

Accessories for the Airplane Owner

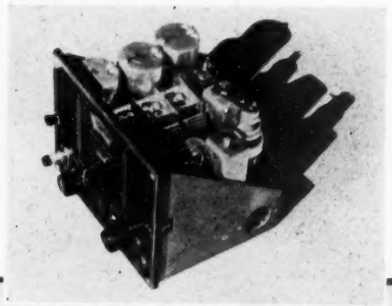
The stock airplane leaves the factory ready to go into service across country, but the manufacturer cannot foresee all of its purchaser's special tastes, interests, and plans. The plane-owner will have to cover those things himself by buying accessory equipment, and in most cases he comes into the market for extras and accessories as quickly as he gets acquainted with his new property and the full possible range of its usefulness. It ought to be the business of the airplane distributor to advise him on what he really needs to get the most use and the most fun out of his ship, and on how he can spend his money to best advantage. The scope of choice, very wide, appears in part from these pages.

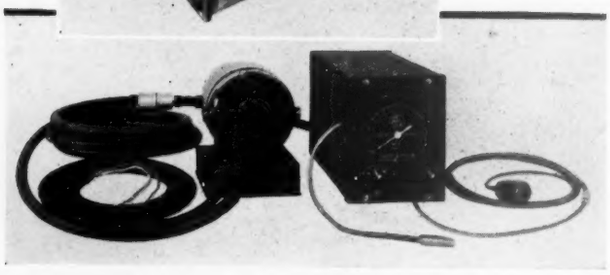
All on a summer's day—11 a.m., wheels—3 p.m., floats.



Controllable-pitch propellers are available as special equipment for greatly improved cruising performance and take-off.

The industrial owner often has urgent need for an aerial camera.





A rapidly growing list of private and industrial owners now consider a radio receiver or even two-way communication as almost a necessity.

Parachutes are now designed into seats, for comfort and convenience.

Standard instrument board equipment may be supplemented by all sorts of special navigation and blind-flying and performance-indicating dials.

Radio and Radio Compasses

Fairchild Aerial Camera Co.
Lear Developments Inc.
R.C.A. Victor Co.
Seabury & Sons, Inc.
Western Electric Co.
Westport Mfg. Co.

Radio Auxiliaries

Eclipse Aviation Corp. (Generators, etc.)
Leece Neville Co. (Generators, etc.)
Electric Storage Battery Co. (Batteries)
Gould Battery Co. (Batteries)
Willard Storage Battery Co. (Batteries)
B.G. Corp. (Shielded Spark Plugs)
Hurley Townsend Co. (Shielded Spark Plugs)
Breeze Corp., Inc. (Shielding Harness)
Eclipse Aviation Corp. (Shielding Harness)
Belden Mfg. Co. (Shielded Wire)
Packard Electric Co. (Shielded Wire)

Controllable Pitch Propellers

Curtiss Aeroplane & Motor Co.
Eclipse Aviation Corp.
Hamilton Standard Propeller Co.
Lycoming Smith Propeller Co.

Instruments

Aeromarine Instrument Co.
Consolidated Ashcroft Hancock Co.
General Electric Co.
Kollsman Instrument Co.
Lewis Engineering Co.
Pioneer Instrument Co.
Sperry Gyroscope Co.
Westinghouse Electric & Mfg. Co.
Weston Electrical Instrument Co.

Cameras

Fairchild Aerial Camera Co.
Folmer Graflex Corp.

Miscellaneous Accessories

Brewster Aeronautical Corp. (Floats)
Edo Aircraft Co. (Floats)
Irving Air Chute Co. (Parachutes)
Switlik Parachute & Equipment Co. (Parachutes)
General Electric Co. (Landing Lights)
Pyle National Co. (Landing Lights)
Burroughs Wellcome Co. (First Aid Kits)
Johnson & Johnson (First Aid Kits)
Pyrene Mfg. Co. (Fire Extinguishers)
Walter Kidde & Co. (Fire Extinguishers)
Bendix Aviation Corp. (Flares)
International Flare Signal Co. (Flares)
Pioneer Instrument Co. (Flares)
Air Associates (General Distributors)
Nicholas Beazley (General Distributors)

EDITORIALS

AVIATION
EDWARD P. WARNER, *Editor*

Supplication for 1935

IT IS VERY BRIEF and simple. It is addressed to all individuals, groups, cliques, agencies of government, corporations, and educational institutions who may feel moved towards a pre-publication of their own achievements. To them, individually and collectively, goes out the fervent petition in Green Pasture-esque phrase: "Stop passin' miracles for a while, and let us find our own way to the Promised Land without shifting the ground under our feet so much."

It seems to be a law of nature that every now and then aviation must find its wagon hitched to an alleged star that turns out to be of the falling variety and plunges itself into the ground with an ear-rending and heart-rending thump. If we had to judge it by proclamation and popular mania, progress since 1927 would look like the track chart of a Mexican jumping bean. There was the OX5-engined-airplane-in-every-garage miracle of 1928. There was the glider miracle of 1930, when a million high school football players were to be synthesized into glider pilots and every American hillside was to blossom forth with the ripened fruits of the Wasserkuppe. There was the light plane miracle of 1931, when the glider that had flopped so ingloriously in the previous summer found itself equipped with an engine and prepared to go forth and conquer the hearts of 20,000 Americans. There was something wrong with that picture, too. After that there ensued a brief space to let the onlookers at these astounding phenomena catch their breath, and then suddenly began a new series of chain-lightning miracles, of which the most spectacular and popularly appealing was the seven-hundred-dollar airplane of vivid memory.

Well, what we mean is, we've had enough of it. All this time, while the jumping bean of imaginative speculation has been providing entertainment for the eye and ear, the responsible aircraft industry, like the humble plodding tortoise of the fable, has been moving slowly but certainly across country. When obstacles to progress show up, the miracle-working sector likes to celebrate them by leaping 6 ft. in the air, letting out a war-whoop, and making a right-angle tack. The manufacturers that are really trying to make aviation a business, on the other hand, have learned by harsh experience to prefer the curious but commendable course of finding out just what and where the obstruction is and then proceeding either to remove or to sidestep it by taking thought and using research.

SO THEY have made progress. So they have a product to offer which has undergone steady improvement in quality and in value returned for money received and which today, as it is displayed elsewhere in these pages, can be regarded with unmixed pride. So they have steadily gained ground in converting business men and sportsmen alike to the ownership of aircraft by showing them what aircraft had to offer.

So it is that progress will continue, that the conversion of new owners will accelerate, and that the market will grow if given even half a chance. By way of giving it half a chance, we suggest that the provision of public excitement can be left to General Johnson, Senator Long, and Father Coughlin, and that aviation may content itself with the more prosaic rôle of providing public service. To remember that "epoch-making" is a high-priced word and to be used sparingly will deprive us of the thrills of recurrently-promised technical revolution, but it will give us a chance to keep moving in a straight line towards our goal.

NEWS *of the* MONTH

★ ***Air Mail and Transport*** **. . . Bureau of Air Commerce conducts ocean and blind-flying experiments off California . . . Pan American Airways sends S.S. North Haven to Pacific with men and materials for air base construction . . . Martin flying boat carries gross weight of 51,000 lb. . . . Mead Air Mail Bill passes House . . . Postmaster General Farley extends mail contracts on seven routes . . . Wiley Post flies through substratosphere from Los Angeles to Cleveland.**

★ ***Services*** **. . . Navy announces conversion of Sunnyvale base into heavier-than-air training center . . . Science Advisory Board appoints committee to examine rigid airship situation . . . House appropriations committee approves expenditure of $1,091,000 for Hawaiian air base.**

★ ***Legislature*** **. . . Congress pushes bills for larger air forces, more Air Corps bases . . . Tables of aviation bills now before Congress.**

★ ***Foreign*** **. . . Hitler formally admits existence of German Air Force . . . Europe plans air armament increases . . . Germany plans Atlantic service with L.Z.129.**

★ ***Industrial*** **. . . Navy awards $2,752,705 contract to Curtiss Aeroplane & Motor Company for 135 planes . . . North American Aviation reports net loss from operations during 1934 of $1,061,371 . . . Kuhn, Loeb & Company becomes second largest holder of Transcontinental & Western Air, Inc. stock . . . Consolidated Aircraft reports net profit of $6,560 for 1934.**

Second Pacific Derby?

SETTING off more rumors throughout the aeronautical industry than any comparable project of recent years, a carefully guarded Douglas transport stood ready a fortnight ago at Oakland Airport for what seemed obviously a flight to Honolulu. Less obvious were the project's exact purpose, the full intended crew list, the relationship of such a flight to the future of Pan American Airways' seaplane service to the Orient. All predictions were finally upset by official denial from Washington of Honolulu intent.

This much could be definitely learned. The plane was the DC-1 singleton precursor of the DC-2 transports. It had been leased by the Bureau of Air Commerce from TWA. In it had been installed sufficient extra tankage to bring its total fuel capacity to some 1,600 gal. and elaborate radio and instrumental equipment including an automatic pilot and a Fairchild-Kruesi radio compass. Several flight tests off the California coast had yielded excellent proof of the effectiveness of the radio and instrument combinations. Aboard on the test flights far out to sea were Captains Albert Hegenberger and Clayton Bissell, Air Corps pilots, and Chester Snow, representative of the Bureau of Air Commerce. Present at early testings, later in charge from Washington, was Eugene Vidal, Director of the Bureau. Mr. Snow, apparently indignant over disallowal of Hawaii plans, suddenly resigned all connection with the Bureau by radio.

Other background material included: announcement by the Secretary of the Navy that leases had been issued to Pan American Airways for the use of Midway, Wake, and Guam Islands for airline purposes, that the leases were *not* exclusive; the designation of the 12,000 gross ton steamer *North Haven* as the supply ship which Pan American sent out late in March to set up bases on those islands; a veiled protest from Japan against such a project; definite indications that Washington will disregard the protest; a statement by Stanley C. Kennedy, president of the Inter-Island Airways that developments of the near future would determine whether his company would cooperate with Pan American or, together with the Matson Navigation Company, set up a competing service; departure from Miami March 27 of the Pan American Clipper for its pioneer flight work in the Pacific, its arrival at San Diego next day after crossing the Gulf of Mexico, flying overland to Mexico's west coast and making an overnight stop at Acapulco; from Baltimore that the Martin 130 had successfully passed its full load (51,000 lb. gross) tests.

Aeronautical reactions caused by the Bureau's adoption of the "mystery" release method varied from (1) interpreting the proposed flight as pro-Pan American since it would demonstrate over the new route the effectiveness of modern navigating equipment; (2) hailing it a "yardstick" measure, especially provocative to potential Pan American competitors because it implied Bureau sanction for the use of landplanes on transoceanic routes; (3) guessing it a preliminary to a specific project in which might figure some of the following: (a) Elliott Roosevelt; (b) Eugene Vidal, subsequent to resignation as Bureau head; (c) Capt. Hegenberger, retired; (d) almost any air transport entrepreneur known to the industry; (e) even Armstrong Seadromes. A few held it simply a device to render more effective planned demonstrations of blind landing technique along the TWA transcontinental route for which the plane had originally been leased, the Air Corps personnel loaned to the Bureau.

More air mail law

Meanwhile most transport operators were infinitely more concerned with what measure of relief might be forthcoming from a stagnated preoccupied Congress. As shown in the accompanying table, and in the one published in this department last month, chief hope now rests with the bill introduced into the House by Representative Mead of New York, chairman of the House Post Office Committee. Specifically enabling the I.C.C. to raise rates (as last amended to a maximum of 48 cents a mile in extra poundage cases), easing the present primary-secondary route requirements, ruling that henceforth no transport operator would be allowed to inaugurate or increase the frequency of any passenger or express service competing with similar activities of an established mail contractor, this bill, much amended, emerged from the Post Office Committee early in March, passed the House March 25 after spirited political debate but without further major change.

To span the interval between Feb. 28 and the enactment of permanent legislation, Postmaster James A. Farley extended contracts on seven routes that would have otherwise expired March 1 for periods from ten to fourteen weeks. He has continued his stand, however, and been supported in it by the Air Mail Division, that present legislation does not empower the I.C.C. to revise rates upward.

Commenting on the situation generally after a meeting of aeronautical executives held in Washington during early March a committee of four, C. R. Smith (president, American), W. A.

Paterson (president, United), Alfred Frank (president, National Parks) and Paul Brittain (vice-president, Eastern) said, "We have faith that the I.C.C. will hear our cases fairly, if given the power by the enactment of the Mead bill, and pass impartially on the facts. Of course, after going through what we have, we have faith in anything. Nothing could be worse than our present situation." Most serious objection raised by an operator to the original Mead provisions was that of TWA, which saw danger to its Chicago-Kansas City and Pittsburgh-Chicago services in phases of the bill dealing with competitive situations. Chicago, Kansas City, Pittsburgh papers editorially supported the TWA position.

But if the legislative side of the transport picture remains somewhat undefined, elsewhere it takes on new lustre as the nation's airways continue to report increasing loadings, new high speed equipment, added schedules. Some highlights:

Nine round trips a day between New York and Washington, new offering of Eastern Airlines in connection with faster schedules to Miami and New Orleans, brings frequency on that route to its highest level since Ludington and Eastern carried on parallel operations.

Chicago and Southern Airlines, formerly the Pacific Seaboard Airlines, has added an evening service to its Chicago-St. Louis schedules, is replacing its single engined equipment with multimotored transports, plans an extension of its night operations to New Orleans when the lighting of that route is completed.

The Nome-Fairbanks operation of Pacific Alaska Airways has been extended to Juneau by way of Whitehorse. Using Lockheed Electras the schedule calls for the entire route from Nome to Juneau to be covered in seven hours' flying. Present surface transport facilities require 34 days between the same points.

A survey by the Bureau of Air Commerce has revealed that the average passenger fare in effect on airlines in this country is now 5 9/10 cents per mile, slight drop from the 6-cent average in effect for the last four years, substantially below the 8 to 10 cents a mile fares common in Europe.

Pennsylvania Airlines, continuing its step-up after the acquisition of a fleet of Boeing 247 transports leased from United Airlines, has added a fourth round trip daily between Detroit and Washington, a fifth between Detroit and Cleveland.

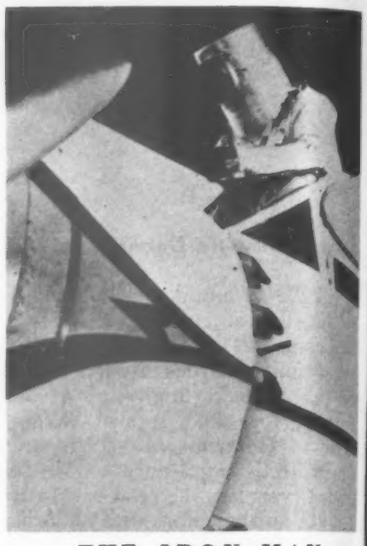
Other leased Boeing transports are in use on Wyoming Air Service's new twice daily schedule between Cheyenne and Denver; on National Parks Airways; on Western Air Express.

Hanford Airlines announces a new afternoon departure from the Twin Cities to connect with United's Pacific Coast services at Omaha. Hanford has recently added a stewardess to the crew of each of its transports, joining United, Western Air Express, and American (on about 80 per cent of its schedules), in offering this feature.

On March 7 Bowen's first new Vultee made its inaugural flight from Brownsville to Dallas. The new service cuts the running time of the trip by 35 per cent.

Pilots Wayne Williams and R. W. Heideman on March 16 landed one of the TWA Douglases at Newark twelve hours and 44 minutes after it had left Los Angeles, thereby breaking all records for a continental crossing by an airplane in regular scheduled transport operations.

An even lower mark for transport planes between Los Angeles and Newark had been set three weeks earlier



THE IRON MAN

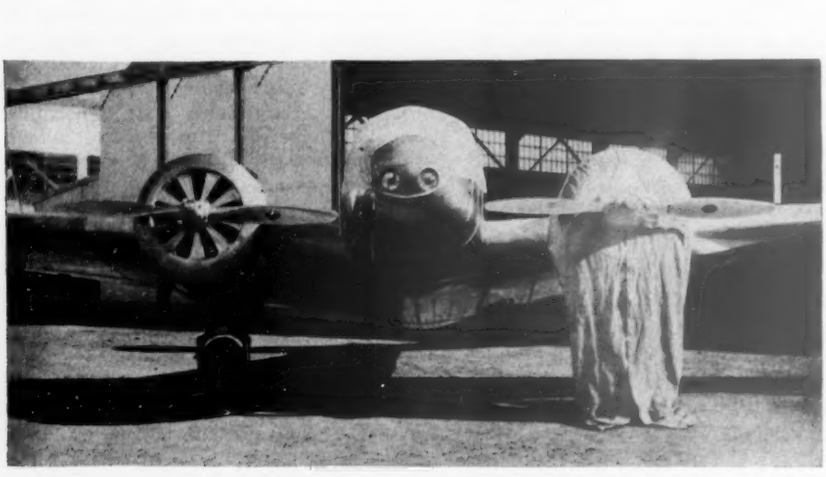
in the aluminum hat does it again. This time Wiley Post accomplishes the remarkable feat of flying 2,250 miles in eight hours and four minutes (271 m.p.h.) in an airplane whose normal top speed is 180 m.p.h.

by American Airlines' pilot Leland S. Andrews in a Vultee, though this flight was no part of American's scheduled operations. Time: eleven hours, 34 minutes. Andrews was accompanied by a co-pilot and a radioman; carried no passengers.

A few days later with the same ship and carrying five passengers, Pilot Andrews cut two hours, six minutes from the Los Angeles-Mexico City record, flew the 1,670 miles in eight hours, nine minutes.

More striking though less completely successful and farther removed from today's air transport was the substratosphere flight from Los Angeles to Cleveland of Wiley Post in his rugged Lockheed, Winnie Mae.

Taking off from Burbank at dawn he dropped his landing gear to decrease resistance, climbed rapidly to 25,000 ft. Set by radio compass, his course led directly over Barstow, Cal., the Boulder Dam region, Denver, Omaha, Chicago. Cloud banks which had hampered navigation all the way piled higher after leaving Omaha. To avoid them Post climbed to 34,000 ft., but ice forming conditions cutting r.p.m. of his engine forced him down again to 17,000 ft. When the weather cleared he climbed once more, flew over Chicago at 30,000 ft., remained at that level until 100 miles east of Cleveland, his oxygen gave out, forcing him to return to the Cleveland airport. He landed there at 5:20 p.m., eight hours and four minutes after take-off; a record for the 2,04[illegible] miles between Los Angeles and Cleveland, average speed—253 m.p.h.; an even better mark for the 2,250 miles actually covered (some 279 m.p.h.). Post made the flight as a full fledged TWA mail pilot, having been sworn in



ARCTIC ELECTRA

Completely equipped for service on Pacific Alaska Airways' routes is this new Lockheed transport. The motor cover is specially designed to facilitate the pre-warming required for operation at extreme low temperatures. Nose shutters over the engine cowling and ice shields to protect the Alclad from ice thrown by the propellers are other features.

several weeks previously. Said TWA's president, Jack Frye: "Post has undoubtedly gained valuable scientific data on the high altitude operation of airplanes. . . these data will enable us to continue experiments in this field."

At TWA's Kansas City base a Northrop Delta mail plane is being prepared for sub-stratosphere work—may be placed at Post's disposal for his next attempt.

Back to Lakehurst

The Naval lighter-than-air program, in process of rapid deflation since the Macon disaster, was last month still able to command headlines. First, an announcement that Sunnyvale (the Navy's recently completed airship base in California) was to be converted into a training center for Naval airplane pilots, its present personnel assigned to sea duty or transferred to Lakehurst, together with the station's non-rigid equipment. Second, the appointment at the request of Secretary Swanson of a committee by the Science Advisory Board to examine into the whole question of airship design and construction. Chairman, William F. Durand; members, Theodor Van Karman, William Hovgaard, Stephen Timoshenko, Alfred V. de Forest, R. A. Millikan, Frank B. Jewett, Charles F. Kettering. Third, the beginning of a year's program of exposure tests on the twelve year old Los Angeles. Four days after that venerable craft had been walked from the Lakehurst hangar, moored at the bow to the station's stub mast, astern to the mobile truck, it proceeded to add one more lesson to the great store of data on airship handling it had already yielded. Caught in a 42 knot wind, its tail rose, lifted the anchor car ten feet off the ground after twisting a considerable length of its track "like a string of spaghetti," as Lt. Commander Rosendahl described it. Aboard was a mast crew of nine men. Casualties; damage to the tail-truck, the track, the rear gondola, some fabric. The tests will be resumed upon completion of repairs.

Other Navy news was the award of the Herbert Schiff Trophy to Training Squadron Two, of the Eighth Naval District (Pensacola) for approximately 10,000 hours of flying with only three minor accidents. Commanding Officer, Lt. L. A. Moebus.

A corresponding item from the Air Corps was the award of the Mackay Trophy for the most noteworthy flight of the year to Brigadier General Henry H. Arnold in recognition of his direction of the Corps' mass flight to Alaska (see page 151).

Further Air Corps briefs . . . The recommendation by a board, appointed by Secretary Dern, of Denver, as a permanent location for the Air Corps technical school now at Chanute Field, Ill. . . The approval by the House appropriations committee of an expenditure of $1,091,000 for a new air base in the vicinity of Fort Kamehameha, Hawaii. . . . The ordering of a two weeks' course in instrument flying technique at Rockwell Field, Cal., for all Air Corps instructors attached to National Guard units.

Congress

In Congress, increasing war talk from Europe and concern with our Far Eastern relations led the Senate to add $20,000,000 to the Army Appropriation Bill, to leave undisturbed that part of it affecting Air Corps equipment, specifically $27,170,000 for the purchase of new aircraft compared to $16,181,000 available during the previous fiscal year. Procurement plans for 1936, upon which the bill is based, call for 469 new planes including 100 pursuits, 118 bombers, 77 attack planes, 19 observation, 75 trainers. Year's losses, estimated at the same figure will keep the total of effective aircraft available at 1,367 on June 30, 1936. Other marked Air Corps increase will be that allowing 643,800 flying hours

Aviation in Congress

(Bills included in this tabulation last month are re-listed here only if they have shown some change in status)

Number of Bill	Introduced By	Purpose and Present Status
H.R.6511	Mead (N.Y.)	To revise the present air mail law so that the I.C.C. can from time to time readjust rates of payment either upward or downward, subject to a maximum limit of 40 cents per mile for carrying 300 lb. of mail and an absolute maximum of 48 cents; to allow a 25 per cent increase in the total mileage now flown with mail; to prohibit the employment of non-citizens by air mail contractors; *to prohibit the inauguration of any off-line service without mail competing with any service rendered by a mail contractor.* Passed the House March 25, and goes now to the Senate.
H.R.6621	McSwain (S.C.)	To authorize the selection and construction of additional Air Corps bases, to the number of six or more and widely distributed over the country in locations to be chosen by the War Department, to serve the purposes of the G.H.Q. Air Force. Favorably reported by the Committee on Military Affairs.
HR.4348	McSwain (S.C.)	To strengthen the Air Corps Reserve and to give it increased control of its own affairs by appointing a Reserve officer as its chief; to assure each Reserve pilot at least six hours per month of flying and to make his status, in case of injury or death, the same as that of a Regular officer.
HR.6250	Thomason (Tex.)	To authorize the immediate commissioning in the regular Air Corps of enough Air Corps Reserve officers to bring the total commissioned strength up to the authorized figure of 1,514. At present this would call for about 380 additional officers. Has been favorably reported by the Committee on Military Affairs.
H.R.6810	McSwain (S.C.)	To provide for regular annual design competitions for military aircraft; for construction of experimental machines at cost, without profit; for subsequent performance competition among the machines so built; for quantity purchase of the type winning the performance competition; for competitive bidding, but with recognition of design right and preference to the originator of the design. A complete re-drafting of the procurement law.
HR.5576	Darden (Va.)	To authorize new construction at naval bases, including $3,000,000 at the Pensacola air station and another $4,000,000 for new buildings at other air stations. Favorably reported by the Naval Affairs Committee, passed by the House.
HR.5548 S.1973	Delaney (N.Y.) Trammell (Fla.)	To grant additional expense money for officers and men engaged in aerial surveys for the government.
H.J.Res.171	Cochran (Mo.)	To give the Distinguished Flying Cross to the Air Corps personnel who flew to Porto Rico in 1923—including Maj. T. G. Lanphier and Maj. Eric H. Nelson.
HR.2012	Dobbins (Ill.)	To authorize $5,000,000 worth of new construction at the Air Corps Technical School at Chanute Field.
S.1984	Steiwer (Ore.)	To establish an Air Corps base in Oregon.
S.1	Clark (Mo.)	To require that government manufacturing plants (such as the Naval Aircraft factory) must obtain government work by competitive bidding against private industry, and that government bids must take into account all those items of expenditure with which private industry has to reckon, such as rent, depreciation, insurance, bonds, and taxes.
H.R.6807	Kenney (N.J.)	To provide for a study, by the Commissioner of Education, of the best forms of aviation instruction for use in the public schools.
HR.6673	McReynolds (Tenn.)	To authorize an annual appropriation of $6,500 for the participation of the United States in the work of the International Technical Committee of Aerial Legal Experts, including the expenses of the American delegates. Supported by the recommendation of the Secretary of State and a special message of endorsement from the President.

next year compared with a maximum preceding annual allotment of 428,900.

War Over Europe

Abroad, the spectacular developments in the German armament situation which marked the month had vitally important aeronautical aspects. The practical impossibility of concealing work on extensive air bases near Berlin, was undoubtedly a prime factor in forcing first an admission by Hitler that Germany did possess a military air force, later the frank induction of the members of the Reich Air Sport Federation into the official Reichswehr. Subsequently a demonstration "attack" on Berlin by German flying forces similar to periodic exercises over London by the Royal Air Force, over Paris by French Army Squadrons, was carried out to emphasize the city's vulnerability. For the test, made at night, Berlin underwent the most thoroughgoing blackout any city has every experienced. A lighted match signalled for arrest.

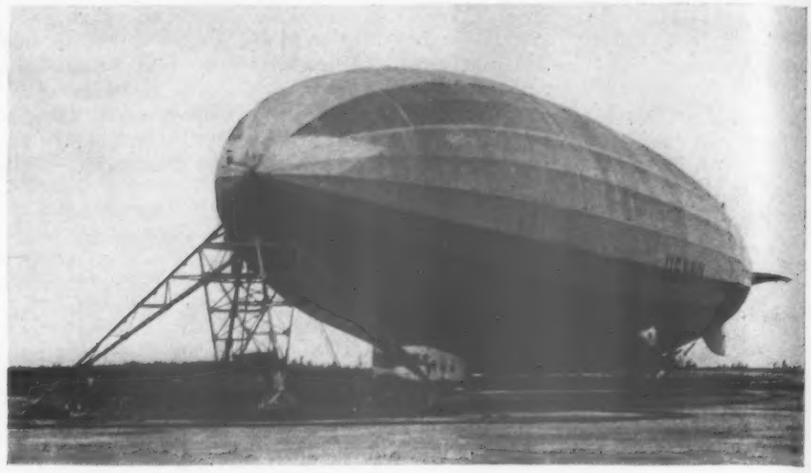
Meanwhile from London and Paris, Rome and Brussels came further discussions of the mutual air defense pact first proposed by France and Great Britain early in February, protests against the German developments, new increases in aircraft procurement plans. At Geneva after a fifteen year debate came the now ludicrous decision that the only practical formula that could be used to distinguish between military and civil aircraft was that military craft are those that carried bomb racks, machine guns, or torpedo release mechanisms. Civil aircraft are those without such appendages.

Sole certainty in all the confusion seemed the immediate step up of military aircraft production throughout Europe on a scale unparalleled since the Armistice.

More peaceful was the news that Juan de la Cierva in England had once more demonstrated an improvement in the autogiro this time a feature which permits a short vertical ascent from a standing start. To the rotor hub is added a further mechanism controlling the angle of incidence of the blades. Set at zero lift, the blades are run up before take-off somewhat above their customary speed of rotation in normal flight. As the starting clutch is disengaged the blades are automatically reset to positive incidence, lift the machine to a height planned as sufficient to clear ordinary obstacles as the propeller running full out produces enough forward speed to maintain level flight.

From Friedrichhaven comes word that the L.Z.129, Giant Zeppelin, now nearing completion, will be used to inaugurate a regular airship service between Germany and the United States on July 15, this year. With a carrying capacity of 50 passengers and 20 tons of mail and goods, the new ship is expected to make the eastward crossing in 48 hours the return trip in 55. Scheduled for a round trip every ten to fourteen days it is to be kept on the North Atlantic service until October, may then be put into service between Germany and Rio de Janeiro.

Likewise of importance to American aeronautical interests was the indication of renewed French interest in the North Atlantic air route given by Baron (and Senator) de la Grange sailing for home after heading a mission to study American factories and transport. Stressing that a flying boat service via the Azores was the obvious first means of attack, he predicted regular operations by 1937, with France by implication as a party to the venture.



TETHERED BUT UNTAMED

the Los Angeles was, last month, started through a year's exposure tests at the Lakehurst mast as a final chapter to its twelve year career. Few days later, abetted by a 42 knot wind it flirted its tail about, did substantial damage.

New contracts

One of the largest single contracts placed in this country for aircraft since the World War has recently been awarded the Curtiss Aeroplane & Motor Company of Buffalo by the Navy. Calling for 135 scout observation planes and spare parts at a total price without engines of $2,752,705, the order returns to activity Curtiss-Wright's largest manufacturing unit, is expected to raise to 2,000 the number of its employees from the 200 level prevailing for some months past.

Government contracts totaling more than $25,000 have been received by the Gould Storage Battery Corporation of DePew, N. Y. The batteries are of special light weight construction to be used in various types of aircraft.

A PWA grant of $27,100 for improvements at Newark airport has been increased to $40,100 to enable the city to install a field radio system, telephone extensions, electrical service alterations and repave a runway.

The Porterfield Aircraft Corporation of Kansas City has moved to larger quarters at 2500 McGee Trafficway. With approximately 100,000 sq.ft. of floor space the new factory provides for much-increased Flyabout production.

The Fokker Airplane Factory of Amsterdam which holds European manufacturing rights on the Douglas DC-2 has received an order for two transports of that type from L.O.T., Polish airline operating company.

Recent plane sales of interest: A Bel-

RICHARD FARNSWORTH HOYT, 46, who for many years played a leading part in the formation and management of aircraft manufacturing and transport companies died March 7 in New York City. Directly after the World War he became secretary and assistant to the president of the Wright-Martin Aircraft Company, later chairman of the board of directors of the Wright Aeronautical Corporation. In 1929 he was instrumental in effecting the merging of the Curtiss Aeroplane & Motor Company and its subsidiaries with Wright Aeronautical Corporation, and became chairman of the board of Curtiss-Wright Corporation, holding this position at the time of his death. Mr. Hoyt was also vice-chairman of the aeronautics committee of the Chamber of Commerce of the United States, and a director of the Aeronautical Chamber of Commerce, Pan American Airways, Transcontinental Air Transport, and the Bendix Aviation Corporation. As chairman of the board of National Aviation Corporation he actively sponsored commuting service to Long Island and Martha's Vineyard from the Wall Street Skyport last summer, being himself one of the first business men to commute to his Wall Street office by seaplane.

lanca Aircruiser to Mackenzie Air Service to be used principally in carrying radium ore out of the Great Bear Lake region. . . . A Douglas Dolphin amphibian to the Standard Oil Company of New Jersey. . . . One Porterfield Flyabout in Brazil, a second to a customer in Mexico City.

Financial reports

Disclosing a net loss from operations during 1934 of $1,061,371, the annual report of North American Aviation, Inc. (Eastern Airlines and General Aviation Manufacturing Corporation) was made public recently revealing that the only profit during 1934 resulted from the sale of securities. The latter, however, totaled $1,268,293, changed the final result to a surplus of $206,921 for the year.

In a statement accompanying the report to stockholders signed by J. H. Kindelberger, president, and Ernest R. Breech, chairman of the board, it was stated that "conditions are not such in the air transport industry as to encourage your company to continue indefinitely in the air transport business unless more reasonable legislation is obtained, not only removing the present restrictions embodied in the Air Mail Act of 1934 but also offering reasonable encouragement for the natural growth of this business."

The report showed operating revenues of $1,928,862 against an operating cost of $2,083,952. With depreciation, traffic expense and other charges, total costs of the company came to $978,914. This figure coupled with direct operating loss minus income credits brought the net operating loss to more than $1,000,000.

Air Investors, Inc. reported net asset value based on cash and market value of securities owned amounted to $1,078,262 on Dec. 31 last, compared with $1,243,618 on the same date of the previous year.

The 29,485 shares of Transcontinental & Western Air, Inc., formerly held by the Pittsburgh Aviation Interest Corporation have been acquired by Kuhn, Loeb, & Co., making the latter second largest holder of this stock. Largest single block (81,000) is held by General Motors Corporation, third largest (20,000) by the Pennsylvania Railroad for whom Kuhn, Loeb, & Co., are bankers. Total outstanding shares are 623,825 of which 279,544 were recently distributed to its stockholders by North American Aviation.

The Consolidated Aircraft Corporation of Buffalo reports a net profit of $6,560 in the year ended Dec. 31, 1934, equal to a fraction more than 1 cent a share. In the previous year the company had reported a net loss of $9,135. Net sales during 1934 totaled $1,552,209 against $2,374,892 in 1933, a drop attributed largely to a 57 day strike in the spring of the year. Looking forward to a splendid year, the corporation started 1935 with a backlog of $4,930,795 in unfilled orders, more than the total sales for the previous year. The company's income account follows: Cost of products sold before depreciation, $1,337,879; gross profits before depreciation $214,329; total operating expenses, $166,213; gross income before depreciation and taxes, $58,154; total taxes and depreciation provision $51,393; net income, $6,560.

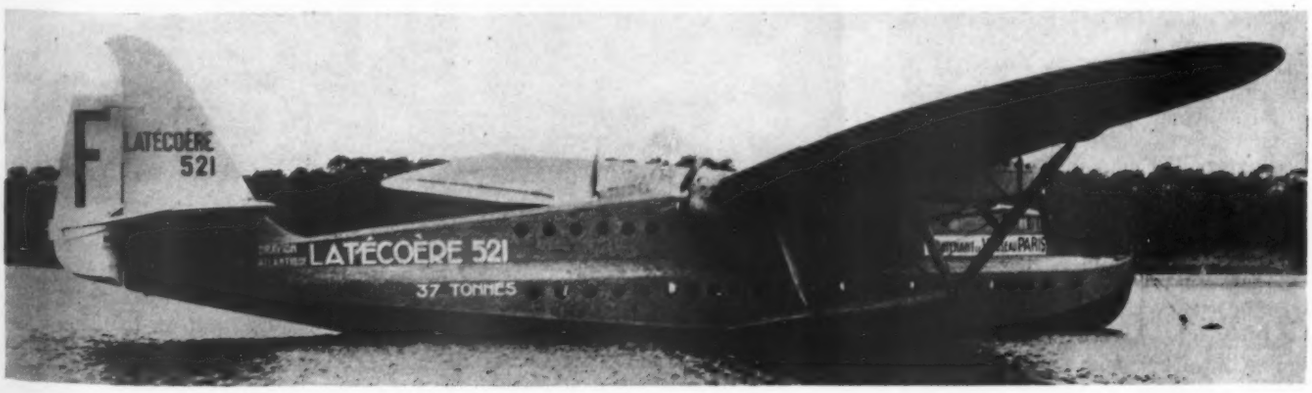
What's Around That Corner?

CONGRESS shows the signs of doing something about air transport at the present session, but not much. The Mead bill will probably pass the Senate in modified form, with somewhat weakened force and more stipulations and restrictions. That will give the I.C.C. power to adjust mail contract rates and avert bankruptcy.

There will probably be no permanent transport legislation at the present session of Congress. Although bills to put all forms of transportation under Commission regulation will almost certainly have the President's sponsorship, they will probably get bogged down in a debate over their bus and truck features and over the details of I.C.C. reorganization and fail of passage. Aviation will be regarded as the tail to the transport kite and may be expected to play but little part in the framing of a law. The whole subject will come up again next spring and something may be done then. In the meantime air transport will have to limp along with the I.C.C.

Military and naval appropriations are breezing through substantially as presented by the budget. A new Air Corps authorization act is likely to pass the Congress, probably providing somewhat more than the total of 2,320 planes recommended by the Baker Board. Procurement legislation, if there is any at all, will probably serve to make clearer and more secure against the Comptroller-General the legality of the War Department's present purchasing policies.

Prospects in the field are for a somewhat slow start of the selling season for private aircraft, followed by a rapid pick-up to the best level in at least four years. Business in June and July ought to run well ahead of the same months a year ago. Sales of transports, though somewhat below last year's should exceed any other year since 1929.



SECOND LARGEST

flying boat design in the world is France's newly commissioned Lieutenant-de-Vaisseau Paris, all-up weight, 70,000 lb. (Largest is still the DO-X, 123,000 lb., third the Martin-130, at 51,000.) Intended for the overseas service of Air France, the Lieut. Paris can carry 70 passengers from Marseilles to Algiers, 30 across the South Atlantic.

FLYING SERVICES *and* SCHOOLS

TO judge the essays submitted in the 6th annual W. E. Boeing Scholarship Competition a committee will assemble at the Boeing School at Oakland, April 5 and 6. Its members are, Dr. Baldwin M. Woods, dean of the University of California; William Stout of Stout Engineering Laboratories, Dearborn, Michigan; Professor John Akerman, head of Aeronautical Engineering at the University of Minnesota; and Professor Allan G. Blaisdell, head of aeronautical engineering at the Carnegie Institute of Technology. The committee will also serve as judges of essays submitted for the Junior W. E. Boeing Scholarship being offered this year for the first time to high school seniors of the Pacific Coast states.

• The Board of Governors of the National Aeronautic Association has approved a resolution to be sent to state governors, pointing out that the taxation of aviation gasoline places an undue burden upon the industry, and requesting the governors of the states not exempting aviation gasoline to take the necessary executive or legislative action to effect the exemption.

• Forty Californians attended the NAA conference at Fresno March 5-6 to discuss aviation bills now before the state legislature. The meeting appointed a committee of three for the purpose of forming a widely representative body of aviation leaders within the state. Dudley Steele of the Richfield Oil Company, was appointed chairman, S. S. Chadderton of Standard Oil Company, and J. W. Miller of Western Air Express, being the other members.

• Members of the Soaring Society of America have undertaken a campaign to raise money in order to take advantage of the offer of the Elmira Association of Commerce to match any amount up to $1,000 that the Society can obtain for prizes at the 6th annual meet to be held at Elmira from June 29 to July 14.

• A new glider club was recently organized by students of the Rising Sun Aircraft School at Philadelphia. A Cessna glider has been purchased and instruction will be in charge of Nicholas Robak, who has had considerable gliding experience. Officers of the club are, S. Cohen, president; Thomas Jamison, vice-president; Nicholas Robak, treasurer, and N. Schmulenson, secretary.

• George W. Orr, president of Roosevelt Field, Mineola, New York, has been elected treasurer of the Independent Aviation Operators of the United States, succeeding Howard Ailor, president of Waco Sales of New York. Oliver L. Parks was reelected president, Ray Brown of the General Tire Company, Akron, Ohio, vice-president, and Louis R. Inwood, secretary. Casey Jones, president of the Casey Jones School of Aeronautics, Newark, N. J., Ray Brown and George Orr were appointed to perfect plans for a more effective working basis for the association.

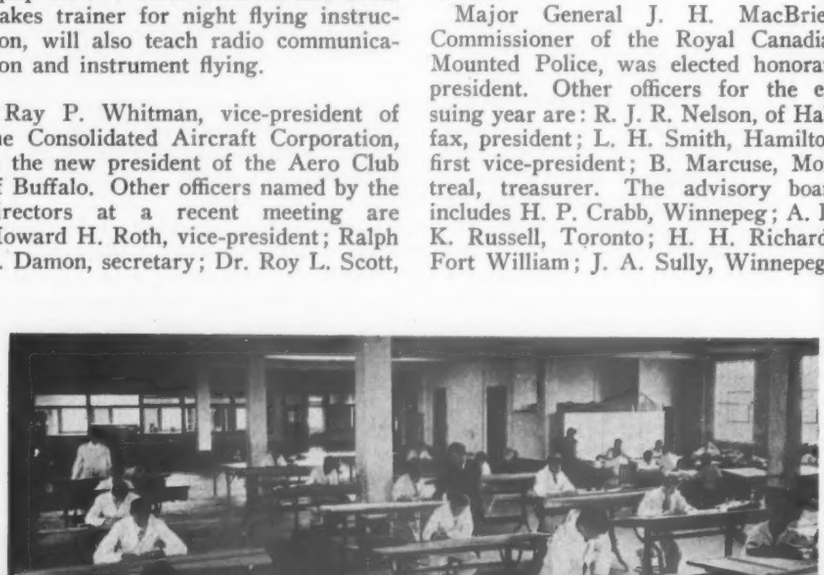
• Russell Moore, for the past four years operator of Moore Flying Service at Fort McKinley, Ohio, is now in charge of the Dayton, O., Municipal Airport at Vandalia, succeeding Howard Mayes. Mr. Moore intends to equip his two cabin Stinsons and Great Lakes trainer for night flying instruction, will also teach radio communication and instrument flying.

• Ray P. Whitman, vice-president of the Consolidated Aircraft Corporation, is the new president of the Aero Club of Buffalo. Other officers named by the directors at a recent meeting are Howard H. Roth, vice-president; Ralph S. Damon, secretary; Dr. Roy L. Scott, assistant secretary, and Raymond S. Madison, treasurer. This organization is one of the oldest flying clubs in the United States, having been incorporated in 1909. Among its 200 members are most of the pilots in the city, many people important in the life of the community.

• Lady Mary Heath, British pilot of many years' experience and formerly a resident of the United States, has taken over Dublin Air Ferries, Ltd., with headquarters at Kildonan Aerodrome, Finglas, Ireland. Three Gipsy Moths and a larger Fox Moth are used for charter work and for instruction. Flying Manager of the school, which includes nearly 100 members, is G. A. R. Williams.

• Delegates to the annual convention of the Canadian Flying Clubs Association met in Montreal March 6. The association comprises 22 clubs extending from Sydney, N. S., to Vancouver, B. C., with an aggregate membership of approximately 2,500. According to reports presented at the meeting flying activities increased 6 per cent in 1934 over 1933 with member flying hours totaling 10,581 as compared with 9,971 in 1933. Licenses issued in 1934 included 134 private and 21 commercial certificates in comparison with 103 private and 26 commercial certificates in 1933.

Major General J. H. MacBrien, Commissioner of the Royal Canadian Mounted Police, was elected honorary president. Other officers for the ensuing year are: R. J. R. Nelson, of Halifax, president; L. H. Smith, Hamilton, first vice-president; B. Marcuse, Montreal, treasurer. The advisory board includes H. P. Crabb, Winnepeg; A. H. K. Russell, Toronto; H. H. Richards, Fort William; J. A. Sully, Winnepeg.



A FULL ENROLLMENT

is the latest report from the Casey Jone's School of Aeronautics in Newark, N. J. 157 students in the day school, 148 in the night courses training as aviation mechanics or as aeronautical engineers fill the quota that had been set as a goal by the school's authorities.

AVIATION PEOPLE

ON March 20, THOMAS A. MORGAN was elected chairman of the board of Curtiss-Wright Corporation, to succeed the late RICHARD F. HOYT. Mr. Morgan, who has been president of Curtiss-Wright for four years, was succeeded by GUY W. VAUGHAN, president of Wright Aeronautical Corporation, who will also remain president of that corporation. Mr. Vaughan formed his first connection with the industry in 1917 when he joined the Wright-Martin Aircraft Corporation, becoming factory manager for both the New Brunswick and Long Island factories. After the War, Mr. Vaughan became vice-president and general manager of Van Blerck Motor Company, Monroe, Mich., later president and general manager of Standard Steel & Bearings Company, Philadelphia. Resigning from the latter in 1925, he became vice-president and general manager of Wright Aeronautical Corporation, succeeding Charles L. Lawrence as president upon the merger of the Curtiss and Wright groups in 1929.

Guy W. Vaughan

Brig.-Gen. Henry H. Arnold

Frank H. Russell

Edmund T. Allen

T. J. Campbell

• Officers of Manufacturers Aircraft Association for the coming year will be FRANK H. RUSSELL, reelected president; GLENN L. MARTIN, EUGENE E. WILSON, SHERMAN M. FAIRCHILD, vice-presidents; JOHN M. ROGERS, secretary; CLAYTON J. BRUKNER, treasurer; SAMUEL S. BRADLEY, general manager. The board of directors is composed of C. F. BARNDT (Great Lakes), C. J. BRUKNER (Waco), S. M. FAIRCHILD (Fairchild), R. H. FLEET (Consolidated), J. H. KINDELBERGER (North American), W. A. MARA (Stinson), G. L. MARTIN (Martin), J. P. MURRAY (Boeing), J. M. ROGERS (Douglas), F. H. RUSSELL (Budd), W. E. VALK, Jr., (Curtiss), E. E. WILSON (Vought).

• RICHARD S. BOUTELLE has been appointed States Coordinator, a new office inaugurated by the Bureau of Air Commerce. His chief duties will be to advise with state aviation officials in problems of legislation, regulation and promotion, and to give special attention to activities of commercial and private aircraft operators. After war time service with the Army Air Service, Mr. Boutelle became state aviation director for Tennessee, then president of the National Association of State Aviation Officials. Since September, 1933, he has been development expert for the Bureau of Air Commerce.

• T. J. CAMPBELL, for the last four years vice-president and general manager of Berry Brothers Detroit, has been elected president of the company, retaining his post of general manger. The retiring president, JOHN C. WITHERSPOON, remains a member of the board.

• The Aeronautical Chamber of Commerce of America has re-elected THOMAS A. MORGAN president, and LEIGHTON W. ROGERS vice-president. New officers are: vice-presidents, DONALD W. DOUGLAS, REUBEN H. FLEET, and ALFRED FRANK; secretary, GIUSEPPE M. BELLANCA; treasurer, CHARLES L. LAWRANCE; assistant secretary, FOWLER W. BARKER; and assistant treasurer, FRANK J. WALSH. ELLIOTT ROOSEVELT, also elected a vice-president, has since resigned.

• Twenty three years ago young SECOND LIEUT. HENRY H. ARNOLD attached to the Army's infant air detail, carried out a reconnaissance flight from College Park, Md., to Fort Myer, Va., and return. The craft used was a Wright B pusher,—the distance covered, some 24 miles. Last year Lieutenant-Colonel Arnold commanded a mass flight of Air Corps B-10 Martin bombers from Bolling Field to Alaska and return, covering approximately 9,300 miles. For the first of these achievements Lieutenant Arnold was made the first recipient of the Mackay Trophy. For the second Lieutenant-Colonel, now Brigadier General, Arnold has again been credited with the Army's most significant flight of the year, again receives the Trophy.

• Pilot EDMUND T. ALLEN is now chief engineer for Eastern Air Lines, transport division of North American Aviation, Inc. After being discharged from the army in 1919 Mr. Allen became test pilot for the National Advisory Committee for Aeronautics, then pilot for the Postoffice Department. Since 1930 he has served as consulting engineer for the Douglas, Northrop, Lockheed, Curtiss-Wright, Vought, General Aviation, Stearman, TWA, and Pan American Grace Airways. Most significant of his recent work has been the development of a scientific basis for the cruising control of transport operations. In addition to his new duties, engineer-pilot Allen continues as regular Vought consultant, as co-author of AVIATION's series of articles on cruising control.

• "To make surveys of the Far Eastern Market, to promote there the interests of the United Aircraft Exports Corporation" are recent assignments that take ERNEST W. DICHMAN from East Hartford to Shanghai, China. Consulting engineer for Chance Vought for the past three years, formerly head of the airplane section at Wright Field, then chief engineer for American Airplane and Engine, Mr. Dichman becomes assistant to the president of United Exports as he takes up his new duties.

• Following the resignation of L. EDWIN GILL to enter the advertising field in New York, PAUL BRATTAIN becomes general traffic manager of Eastern Air Lines. Mr. Brattain who

is vice-president of North American Aviation (AVIATION, February) will also act as assistant general manager. Assisting him are GOODRICH MURPHY, former district traffic manager for American Airways, who becomes northern divisional traffic manager at New York, and JOHN K. OTTLEY, who has become southern divisional traffic manager.

• CAPT. EDWARD N. ROBBINS, since 1933 Army Air Corps representative at the Boeing plant, has been transferred to Northrop in similar capacity. With him go F. C. ROCKHOLD, W. A. ZIESING, H. A. MORLEY, and S. R. CARPENTER, inspectors. Captain Robbins is succeeded at the Boeing plant by CHARLES CRESSWELL.

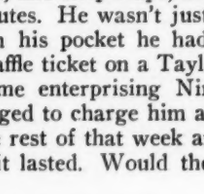
• R. L. FRY, of Pocatello, has been appointed as State Aeronautics Engineer for Idaho, to succeed A. L. BLOMGREN, resigned. Mr. Fry's flying experience dates from 1917, includes graduation from the Army school at San Antonio, four years as a mail pilot.

SIDE SLIPS

WELL, Spring is here again, the season of fresh coats of startling paint on the airport gas trucks, of new sky blue jodphurs on the local airwomen, of renewed hopes and restored windsocks; the time of year when people, who couldn't raise the price of a pipe tray made from the hub of a war-surplus propeller, dream over their Bock beer of footloose two thousand mile cross-country jaunts in their own de luxe airliners.

EVEN our office boy, protected as he is from the lure of the open sky by constant contact with jaded airmen, came in the other day with that Springy look about him and a decidedly unnatural interest in all things aeronautical like specification tables, and strip maps, and the price of parachutes. He wasn't just dreaming either. In his pocket he had one fully paid up raffle ticket on a Taylor Cub for which some enterprising Ninety-Niner had managed to charge him a dollar.

For the rest of that week and most of the next it lasted. Would the mail girl



like a ride? Would this or that elevator boy like to take lessons next summer some time? How many miles could you go on a gallon if you went way up high and glided? How much do fur helmets like Mr. Ray's cost?

Then came a cold grey Saturday morning and the old time air-unconscious lad we were beginning so sadly to miss. How was his plane this morning? Nuts. What's the matter? Was he sick of popularity and big pay? Nuts to us, plenty.

We found the trouble later stuck way off on the back page of the afternoon paper. "At a raffle last night held at the Hotel New Yorker and sponsored by the Ninety-Niners, an organization of girl flyers, a small sport monoplane was won by Edwin C. Musick. Mr. Musick is chief pilot for the Pan-American Airways."

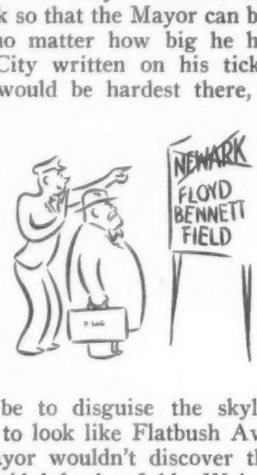
BUT so much for Spring, the gay deceiver, and the difficulties of dividing this world's goods under the Capitalist system. S. P. J., our esteemed Associate Editor, brought back from his recent journey over the airlines another of those endless ways they have of doing things in California which would be so helpful here in the East if we could only make them work in our climate.

He'd embarked one night, it seems, at Fort Worth on one of the American Airlines, sleeper planes scheduled to arrive early the next morning at Glendale Airport in Los Angeles. The air was smooth, the berth was soft, the editorial sleep was sound as sound could be. When he awoke at last, the plane was already taxiing across an airport toward hangars bathed in daylight. Dressing leisurely, he collected his bags, thanked the hostess, climbed down the steps, and . . . howled. For there, written all over the hangars, and offices, and trucks, fences and as far as his startled eye could see was the legend "San Francisco Municipal Airport."

He clutched for his ticket stub. No, there *that* was as big as life "Glendale." He flashed back to the story of the sleeper plane that started for Chicago a year or so ago from Newark, was caught in bad weather, fled eastward, landed its sleeping passengers finally in Lowell, Massachusetts. But no, the sky was blue, the other passengers going calmly through the barriers to the restaurant. He counted his money. His money was low. He was still trying to think of some reassuring test for his sanity, when around the corner came a huge truck from the Warner Brothers film company which slid to a stop and disgorged among other gear a large neon sign which also said "San Francisco Municipal Airport" and which was solemnly added to the rest of the display. Later came actors and directors, yes men and extras, and a great to-do as the filming of "The Case of the Curious Bride" proceeded.

But S. P. J. didn't thrill much to that he says; he'd already had his little daily turnover.

Well, to go on a bit, we haven't got it fully worked out yet but we are somehow obsessed with the hunch that here is something for ending that ruthless rivalry between Mayor La Guardia's Floyd Bennett Field and the Newark Municipal Airport. The difficulty lies in deciding which way to work it; whether to put Newark signs on Floyd Bennett in an attempt to lure incoming pilots and the Post Office Department onto the larger, emptier field, or whether to put the Floyd Bennett signs on Newark so that the Mayor can be landed there no matter how big he has New York City written on his ticket stub. What would be hardest there, though,



would be to disguise the skyline and harbor to look like Flatbush Avenue so the Mayor wouldn't discover the hoax after he'd left the field. We're afraid our little Eastern studios aren't quite up to that yet.

WE UNDERSTAND that the purpose of Mr. Post's experiments is to establish the practicability of high speed stratosphere flying. While we are a firm believer in the future of this type of flying we don't think that the type of apparatus Mr. Post is wearing is ever going to be popular with the flying public, particularly, not with the "traveling salesman" type. Even the most beautiful of the stewardesses wouldn't be very attractive attired in the aeronautical equivalent of a deep-sea diver's suit.

Also, we can't figure out how this apparatus is going to work out with the sleeper planes—imagine the effect on the sleeper of his own snoring inside of a tin helmet! There are other possible difficulties too—think of having to ring for the porter during the night to get an extra bottle of oxygen—and just how is one to shave in the morning?

On the other hand there are real advantages to the new apparatus — the traveling salesmen would be reduced to the art of pantomime for telling their stories and nobody would be able to smoke any of those "good five cent cigars."

OPERATOR'S CORNER

An exchange of ideas on the problems of the commercial aviation industry

QUESTION 4: What are your policies for inspection and servicing of equipment? At what intervals have you found it necessary to overhaul engines; other parts of planes? How do maintenance costs vary for different types of service? What is the usual life of mechanical equipment, i.e., the time when it is more economical to replace than to repair? (Answers in addition to those which follow will be published in May.)

Appearance is important

MAINTENANCE and overhaul practice and the life of equipment varies with different types of ships and their uses.

For our student work we use two Great Lakes trainers and an Aeronca. Neat appearance of equipment is essential for commercial work. The students will take our word for it that the ship is in good condition mechanically but if it does not give an appearance of being well taken care of, it is hard to convince our prospects that our equipment is safe.

Each day before a ship is flown, it is given a visual inspection. If for any reason the motor is not working just right after warm up, the ship is test hopped before the student takes it over. As Sunday is usually our best day, Monday morning is set aside for ship inspection and we do not schedule any flying for that time.

The Aeronca motor is overhauled at the factory every 400 hours. The Cirruses are taken apart every 200 hours for a complete check. The cost of replacements then are not very high and we feel that the ship is safer for student work. We have also found that, with two ships of the same make, one flown by two or three advanced students who received their instruction with us, and the other flown by the students when learning, that the maintenance on the ship used by the less advanced students is about twice as high as that of the one flown by the more experienced pilots.

When a ship is in need of a complete overhaul and is to be put back in commercial service, we have to consider its appearance in relation to that of a similar but more up to date ship that may be used by a competitor. If the ship looks obsolete after an overhaul, however good it may be, it will still be difficult to sell to the public and it is better to replace than to repair.—D. E. RICHARDSON, *Ann Arbor Air Service, Ann Arbor, Michigan.*

Daily inspection policy

WE have followed a daily inspection policy for years, applying of course, to equipment used daily. We believe this plan has saved us many dollars and the fact that our seven or eight years of school work have been absolutely free from accidents of any kind is proof of the desirability of this plan.

We have not specified any particular number of hours of operation of an engine before an overhaul. This period has been governed rather by the condition of the

Fred Wahl

A. Elliott Merrill

engine. The same thing applies to the airplane.

The average life of an engine is less than 1,000 hours. Most modern airplanes can be flown 2,000 to 3,000 hours with reasonable care before writing off.—LEE U. EYERLY, *president, Eyerly Aircraft Corporation, Salem, Ore.*

Economy and pilot assignment

IMMEDIATELY after a flight or after the day's flying has been completed the pilot makes a note of any defects noted in flight and a mechanic makes the necessary repairs and also gives the plane an inspection for other wear that may need attention. This work is done as soon as the ship is in the hangar. After all work is completed the ship is serviced for next day's flying. Engines are given regular inspections and, with extreme care in warming up and cooling off, we have been able to get more than 300 hr. before any work of any magnitude is necessary. Oil change is made every 20 hr. and found to pay in life of motors. Planes are inspected daily and every part needing attention is immediately taken care of and repaired or replaced. In this manner ships get hundreds of hours before any major work is necessary such as recovering, etc.

The cost of operating planes in passenger service with one pilot flying them is approximately half of that of the ships doing student work or flown by several pilots. Therefore the practice of assigning a pilot to one ship steadily is directly responsible for economical operation.—FRED WAHL, *president, Mountain Airways Corp., Rawlins Municipal Airport, Rawlins, Wyo.*

Question 5

(Answers will be published in May)

DO YOU consider it advisable to continue your ground school instruction during flight training? Are ground courses economically justified? Have they been found to be successful as producers of students for flying courses? Should they be considered a prerequisite for flight training? Should this expense be absorbed by a charge separate from that for flight instruction or should the cost be included in that of the flight instruction, calling the ground course free? (Submitted by A. Elliott Merrill, president Washington Aircraft & Transport Corporation, Seattle, Wash.)

Question 6

(Answers will be published in June)

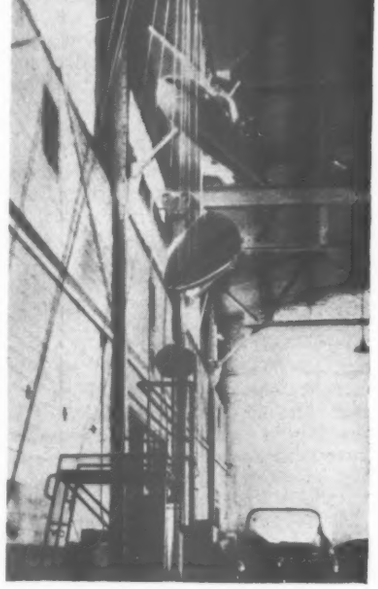
HOW many hours do you require a student to have before cross-country trips? What is the method of payment? Does he receive a rebate on the gas he buys away from the field? (Submitted by D. E. Richardson, Ann Arbor Air Service.)

Eliminates top-overhaul

FROM my personal observation during the past eight years I can trace the cause for the success or failure (failure in most cases), of aviation operators directly to an inadequate or undermanned inspection and servicing department. I have heard many operators wonder why they seem unable to keep their airplanes in the air and why they seem to have so much bad luck with forced landings and other mechanical troubles. The answers are the same—either inexperienced mechanics or no definite repair and inspection policy.

Our airplanes and their engines are given rigid daily inspections before flight, the usual twenty hour servicing, the hundred hour periodic inspection and the engines removed at regular periods, determined by past experience, for major overhauls. We have definitely abandoned and eliminated the top-overhaul. We keep a spare engine, of each type we use, on hand and in perfect condition ready to go into a plane at a moment's notice. The engine that is removed can then be kept in the shop long enough to be given a major overhaul and the airplane is not tied up in the hangar producing no revenue. Three hundred hours is the maximum time allowed on an engine being used by students or rented to private pilots. It is then given a complete major overhaul. On engines of less than 100 hp. we find that it is necessary to overhaul at more frequent intervals. Our experience has been that the over-all or total cost of repairs on an engine during its entire life will be at a minimum if given major overhauls at frequent intervals in spite of the fact that major overhauls cost more than top-overhauls.—A. ELLIOTT MERRILL, *president, Washington Aircraft & Transport Corporation, Boeing Field, Seattle, Wash.*

THE MAINTENANCE NOTEBOOK



Above: Complete cowling for each engine nacelle is stored on these racks in United's hangar at Cheyenne. Below: Overhead parts storage in the service hangar of Aeronautic Industries, Inc., at Glendale.

Power Distribution Board

PRACTICALLY every shop has its own solution to the problem of getting power distributed about the servicing hangar floor to feed portable flood lights, trouble lights, or electric hand tools. Here is one worked out at Eastern Air Lines' Atlanta base that combines portability with a certain degree of stability and affords a means of storage for spare power and light cables. The six-plug power panel is bolted to a small welded steel tube tripod. The T at the top makes a convenient handle. Three short pieces of tubing, one welded on each leg, form a cradle into which the cables are coiled when not in use.

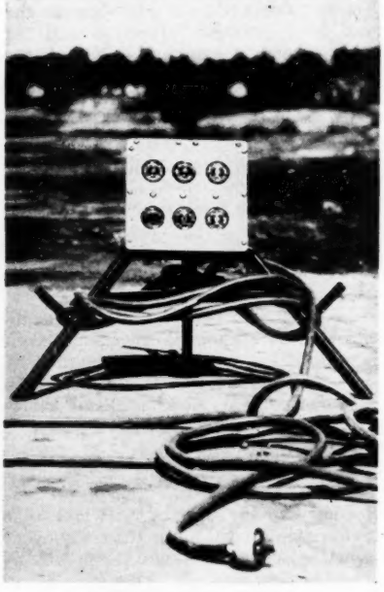
Cowl Storage

EVERY servicing hangar in the country is faced with the necessity of taking care of sections of cowling during airplane and engine maintenance. Ring cowlings, wing fairings, nacelle coverings, wheel pants and exhaust manifolds cannot be allowed to kick about on hangar floors or be piled indiscriminately in odd corners. The risk of damage both to parts and to personnel is too great.

A number of interesting solutions to this problem come to light in the several shops about the country. United Air Lines at the Cheyenne station has worked out a compact portable rack arrangement which will take care of the complete cowling for one nacelle of a Boeing 247. The racks are built of wood, mounted on large swiveling rubber-tired casters and have spaces marked out in black paint for each piece of cowling. Pins are provided on which cowling sections can be hung.

Other air lines use portable racks of a somewhat different nature. TWA at Kansas City, for example, stores sheet metal parts on large portable shelves, somewhat similar to the usual engine parts rack. These racks are on casters, are built of angle iron with wooden shelves. Pan American at Brownsville keeps on hand a number of large open-top boxes, also on casters. The boxes are divided into three compartments each large enough to take the sheet metal parts from the nacelles and the nose engine of a Ford transport.

A rather novel but apparently equally effective, arrangement has been worked out by the servicing department of Aircraft Industries, Inc., at Grand Central Airport, Glendale. Up in the roof trusses a series of pulleys has been hung, 2 or 3 ft. apart along the hangar walls and a rope halyard rigged down to cleats fastened to the wall directly below each pulley. As wheel pants, exhaust manifolds, cowling, etc., are removed from ships undergoing overhaul, each piece is hooked to a rope and hoisted up overhead. In this way the floor is kept entirely clear. Each part is in plain sight and readily accessible when needed.



Portable power board.

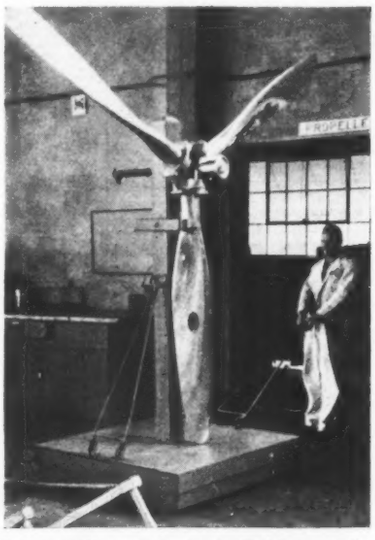
Handling Big Propellers

THE time has long since gone by, in transport maintenance shops at least, when a mechanic could unbolt a propeller single-handed and take it into the overhaul shop by the simple expedient of carrying it on his shoulder. Some of the three-bladed controllables now in service run to 12 and 13 ft. in diameter, weigh up to 350 lb. and the shops where such equipment must be serviced have had to develop methods for handling which will not only be convenient but which will, at the same time, protect propellers from damage.

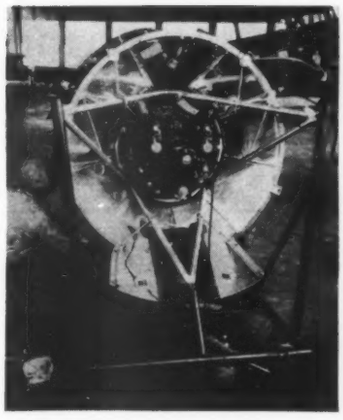
Accompanying illustrations show how the job is done in two of the country's outstanding shops. At Kansas City, TWA has put into service a welded steel tube buggy mounted on small pneumatic tired wheels to take care of the two propellers for a Douglas transport. The dolly can be rolled into place under the nose of each nacelle and, as the propeller is removed from the engine shaft, it can be lowered by means of an overhead hoist onto the hub

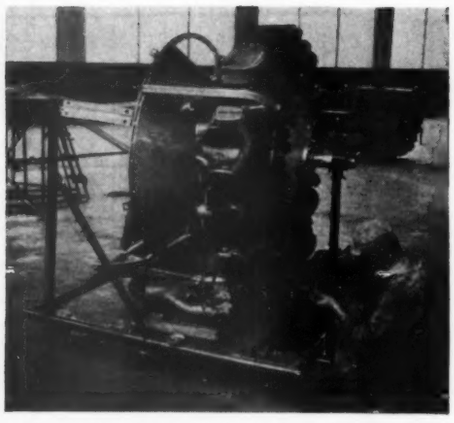
cradle. A strap around the upper blade holds the propeller in place when the buggy is pulled around the shop.

Pan American Airways, in servicing the big Sikorsky Clippers at Miami, does the same job in a somewhat different way. The transfer buggy consists of a wooden platform on swiveling casters in the center of which a large wooden post is mounted. Near the top of the post is a spindle which projects through both sides at sufficient distance to carry a propeller. The spindle is of somewhat smaller diameter than the propeller shaft, and is suitably protected to prevent damage to the hub splines. The end of each cross arm is threaded and carries a nut and washer which prevents the propeller coming off once it is mounted. A pair of wooden latches which can be turned vertically or horizontally, prevent the propeller from rotating on the spindle. To get from the hangar through the door into the propeller department, the wooden latches are swung to the vertical position and the propeller partially rotated as it passes through the doorway. There is, of course, enough clearance to allow the vertical supports to pass through without striking the lintle. Once inside, the propellers are handled by means of an overhead hoist and trolley system which serves both the protractor table and balancing stand.



For handling large controllable propellers, Pan American at Miami uses the device shown above. TWA's propeller truck is shown below.



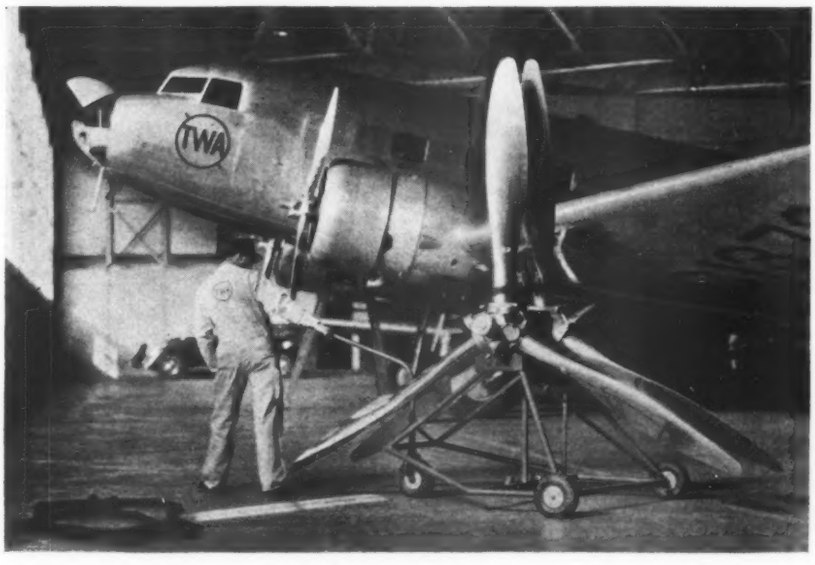


Two views of Condor nacelle jig used at American Airlines Fort Worth Base showing method of construction and indicating complete accessibility of rear end of engine for connecting up auxiliaries and controls.

Condor Nacelle Jig

AT American Airlines' Fort Worth Base, considerable time and money is being saved on Condor overhauls by the use of an engine nacelle jig on which the engine auxiliaries, controls, pressure baffling, and cowling may be assembled and fitted up before final mounting as a unit in the airplane. The jig is built of welded steel tubing, mounted on swiveling casters for easy transport about the servicing hangar. At the rear end, fittings are arranged to correspond to the engine-mount fittings on the plane, and a small saddle mounted on a vertical tubular strut supports the propeller shaft. By providing the forward support a great deal of strain is taken off the rear jig fittings, making it possible to preserve their alignment accurately without going into extraordinarily heavy construction.

W. F. Van Cleave's wheel pants guard in place on a Stinson Reliant.



Wheel Pants Guard

SOME time ago, W. F. Van Cleave, who operates the Van Cleave Airplane Company in Hangar 9, Love Field, Dallas, became a bit fed up on repairing dents and scratches on wheel fairings on the airplanes stored in his hangar. "No step" signs painted or hung on the wheel pants seemed to be of little effect in keeping people away, so he had his welders make up a number of tubular guards which he now keeps around the wheels of every airplane in storage. These simple protective devices are made of scrap tubing, are light and are easily stored when not in use, and have already saved many times their cost in repairs to landing gear fairings.

American airplane specifications

AVIATION does not assume responsibility for the figures given

Manufacturer	Designation or Model No.	A.T.C. number	Price at factory	Type	Number of seats	Make of engine	Total rated hp.	At altitude, ft.	R.p.m. at rated hp.	Fuel capacity (gal.)	Normal range (mi.)	Fuel consumption at cruising speed (gal. per hr.)	Propeller Diameter—in.	Wing loading (lb. per sq.ft.)	Power loading (lb. per hp.)	Weight empty with cooling water if used	Useful (lb.)	Gross weight (lb.)	High speed (m.p.h.)	At altitude, ft.	Cruising speed (m.p.h.)	At altitude, ft.	R.p.m. at cruising speed	Stalling speed (m.p.h.)	Climb at sea level (ft.p.m.)	Service ceiling (ft.)
SINGLE ENGINED PLANES WITH SEATS FOR FEWER THAN FOUR PERSONS																										
Aeronautical Corp. of America	C-3-500 Series	*19	1,890	CML	2	Aeronca	40	S.L.	2,500	8	200	3.0	66	7.06	25.10	569	437	1,006	93	.....	85	.....	2,250	35	450	12,000
Aircraft Mechanics, Inc	D-1		1,450	CML	2	Con	37							5.50	25.30	573	389	962	80	.....	73	.....		30	400	8,500
Aircraft Mechanics, Inc	D-2	44	1,575	CML	2	Sz	45	.....	1,750	7	160	3.3	72	5.63	21.80	590	392	982	90	.....	78	.....	1,650	31	700	13,000
Aircraft Mechanics, Inc	A-14	2-10	.....	OBL	3	Wr Ww	175	.....		66	510	.....		7.89	15.70	1,651	937	2,588	119	.....	100	.....		43	925	16,000
American Eagle-Lincoln Aircraft Corp	B-32	45	1,575	OML	2	Sz	45	S.L.	1,750	11	250	3.0	76	6.29	20.50	509	413	922	90	.....	75	.....	1,600	28	450	14,500
Bellanca Aircraft Corp	28-70		44,500	CML	2	Pwj-G[1]	750	9,000	2,400	600	3,000	.....	126	30.00	11.13	4,150	4,200	8,350	256	9,000	230	9,000	2,400	74	1,540	26,000
Consolidated Aircraft Corp	Fleet 10	*374	.....	OBL	2	K	125	S.L.	1,925	24	313	7.8	96	8.72	14.10	1,078	Var.	1,761	115	S.L.	96	S.L.	1,750	50	862	14,300
Consolidated Aircraft Corp	Fleet 11	*52	.....	OBL	2	K	160	S.L.	1,975	27	275	9.5	96	8.70	11.10	1,175	Var.	1,740	124	S.L.	109	S.L.	1,750	50	1,178	17,800
Consolidated Aircraft Corp	PT-11C		.....	OBL	2	Wr Ww	250	S.L.	2,000	42	380	12.0	96	9.60	10.80	1,952	748	2,700	132	S.L.	112	S.L.	1,800	52	1,060	16,000
Cunningham-Hall Aircraft Corp	GA-21		.....	OML	2-3	War	145	S.L.	2,050	32	500	9.0	86	14.20	12.80	1,300	750[2]	2,050[2]	162	S.L.	140	S.L.	1,925	40	1,300	17,000
Curtiss-Wright Airplane Co	Sport 16-E	*46	.....	OBL	3	Wr Ww	175	.....	2,000	33	350	10.5	102	10.40	12.30	1,357	793	2,150	135	.....	115	.....	1,750	48	1,200	17,500
Curtiss-Wright Airplane Co	Speedwing A-14-D	*44	.....	OBL	3	Wr Ww	250	S.L.	2,000	58	530	14.5	104	11.60	11.50	1,772	1,098	2,870	155	.....	132	.....	1,750	56	1,000	18,000
Curtiss-Wright Airplane Co	Speedwing B-14-E	*48	.....	OBL	3	Wr Ww	330	.....	2,000	66	550	17.5	102	12.40	9.30	2,008	1,059	3,067	170	.....	145	.....	1,750	57	1,600	20,500
Curtiss-Wright Airplane Co	Speedwing D-14-R	*	.....	OBL	1-3	Wr Ww	420	.....	2,150	76	500	.....		12.40	7.30	2,110	957	3,067	185	.....	157	.....	1,850	57	1,800	24,500
Fairchild Aircraft Corp	C-7-D	50	2,990	OML	2	Wr Gy	90	S.L.	1,950	21	350	5.5	83	9.10	17.20	992	558	1,550	112	S.L.	95	S.L.	1,750	49	568	13,000
Fairchild Aircraft Corp	C-7-G		4,975	OML	2	War	145	S.L.	2,050	40	500	9.5	83	12.40	14.50	1,240	860	2,100	135	S.L.	120	S.L.	1,900	52	730	15,000
Fairchild Aircraft Corp	C-8-C		4,990	CML	3	War	145	S.L.	2,050	40	490	9.5	83	12.90	16.60	1,390	1,010	2,400	133	S.L.	118	S.L.	1,900	53	700	15,500
Fairchild Aircraft Corp	C-8-D		4,990	CML	3	Ran	145	S.L.	2,200	40	525	9.0	75	12.90	16.60	1,440	960	2,400	133	S.L.	118	S.L.	1,925	53	650	15,500
Granville, Miller & De Lackner	Q.E.D.		31,000	CML	2	Pwh	675	6,000	2,050	400	2,000	40.0	104	33.20	10.40	3,812	3,188	7,000	240	6,000	200	6,000	.....	69	2,050	25,000
Great Lakes Aircraft Corp	2-T-1-A	228	.....	OBL	2	Cir	100	.....		26	370	.....	78	8.45	15.80	1,016	564	1,580	110	.....	90	.....		.....	600	.....
International Aircraft Corp	INB-4	45	1,095	OML	1	Heath	25	.....	2,800	9	250	2.4	57	5.16	28.00	450	250	700	71	.....	60	.....	2,450	39	300	9,000
International Aircraft Corp	CNA-40	49	1,275	OML	1	Con	37	.....	2,550	7	180	2.7	60	6.30	18.20	454	221	675	85	.....	72	.....	2,350	43	420	11,000
International Aircraft Corp	INA-40	48	1,250	OML	1	Con	37	.....	2,550	9	250	2.7	60	5.16	18.90	459	341	700	80	.....	70	.....	2,300	39	450	12,000
Kinner Airplane & Motor Corp., Ltd.	K-Sportster	49	2,990	OML	2	K	100	.....	1,810	24	360	6.0	90	9.27	18.75	1,218	657	1,875	104	.....	90	.....	1,700	40	800	14,000
Kinner Airplane & Motor Corp., Ltd.	B-Sportster	51	3,290	OML	2	K	125	.....	1,925	35	400	8.8	90	9.27	15.00	1,232	643	1,875	112	.....	100	.....	1,725	40	900	15,000
Kinner Airplane & Motor Corp., Ltd.	B-2 Sportwing	52	3,880	OML	2	K	125	.....	1,925	35	440	8.8	92	11.18	15.60	1,323	627	1,950	120	.....	110	.....	1,725	45	850	14,500
Kinner Airplane & Motor Corp., Ltd.	R-Playboy	55	5,250	CML	2	K	160	.....	1,975	52	590	11.0	96	13.85	14.20	1,494	776	2,270	135	.....	125	.....	1,775	55	800	14,000
E. M. Laird Airplane Co	LC-1B-285	Apl	11,000	OBL	3	Wr Ww	285	S.L.	2,100	85	700	16.2	102	10.46	10.82	1,955	1,128	3,083	160	S.L.	138	S.L.	1,900	46	1,500	21,500
E. M. Laird Airplane Co	LC-B-300	35	10,850	OBL	3	Wr Ww	300	.....		76	550	.....	108	10.30	10.10	1,930	1,090	3,020	150	.....	120	.....	1,850	45	1,600	22,000
E. M. Laird Airplane Co	LC-R-300	17	11,500	OBL	3	Wr Ww	300	.....		76	550	.....	114	15.30	10.30	1,922	1,088	3,010	175	.....	135	.....	1,850	55	1,500	20,000
E. M. Laird Airplane Co	LC-RW-300	37	14,250	OBL	3	Pwj	300	.....		78	600	.....	114	15.30	10.30	1,922	1,088	3,010	190	.....	150	.....	1,850	58	1,600	22,000
E. M. Laird Airplane Co	LC-RW-450	Idg	21,000	OBL	2	Pww	450	5,000	2,000	104	600	30.0	114	14.80	7.50	2,120	1,080	3,200	190	5,000	155	5,000	1,900	60	2,500	25,000
Lockheed Aircraft Corp	Altair 8-E	35	24,500	OML	1	Pww	550	5,000	2,200	175	1,150	29.0	108	19.72	10.54	3,550	2,250	5,800	220	5,000	205	11,000	2,000	63	1,400	24,000
Lockheed Aircraft Corp	Altair 8-D	46	24,500	OML	2	Pww	550	5,000	2,200	175	1,150	29.0	108	19.72	10.54	3,550	2,250	5,800	220	5,000	205	11,000	2,000	63	1,400	24,000
Monocoupe Corp. (Lambert)	90	*30	2,885	CML	2	Lam	90		2,375	28	588	5.0		11.50	16.90	888	631	1,519	120	.....	100	.....	.....	40	900	15,000
Monocoupe Corp. (Lambert)	90-A	*	3,750	CML	2	Lam	90		2,375	28	700	5.0		11.90	17.60	935	650	1,585	135	.....	115	.....	.....	40	900	15,000
Northrop Corp	Gamma 2-D	549	.....	OML	1-2	Wr Cy	710	7,000	1,950	334	1,750	43.0	120	20.20	10.20	4,119	3,231	7,350	223	7,000	213	16,000	1,850	62	1,100	24,000
Porterfield Aircraft Corp	35-70	*498	1,795	CML	2	Lb	70		1,950	17	315	5.3	78	8.60	17.60	748	487	1,235	120	.....	105	.....	1,850	40	600	17,000
Wiley Post Aircraft Corp	A	56	1,438	OBL	2	Wp	40	.....	1,900	7	200	3.0	74	4.80	25.00	605	393	998	80	S.L.	70	S.L.	1,800	27	600	10,000
Rearwin Airplanes, Inc	4,000	46	1,875	CML	2	Aero	50	.....	2,125	12	250	3.5	.....	5.95	21.30	635	430	1,065	92	500	80	.....	1,925	30	600	.....
Rearwin Airplanes, Inc	7,000		.....	CML	2	Lb	70			24	450	6.0	.....	8.13	18.00	790	560	1,350	110	.....	100	.....		35	700	.....
Rearwin Airplanes, Inc	6,000		3,295	CML	2	Cir Id	96		2,100	34	600	7.0	.....	11.05	16.90	992	613	1,605	144	500	120	500	1,900	39	800	.....
Ryan Aeronautical Co	ST	54	3,985	OML	2	Men	95	S.L.	2,100	24	400	6.5	76	12.50	16.50	1,027	543	1,570	140	S.L.	120	1,200	1,900	40	850	14,600
Security National Aircraft Corp	Airster	*52	1,985	OML	1	Se	120	S.L.	1,900	25	300	8.0	96	6.75	14.67	1,197	576	1,775	110	S.L.	100	S.L.	1,800	45	1,000	14,000
Skylark Aircraft Corp	3-95	*	1,995	OBL	2	Cir Id	95	S.L.	2,100	22	300	6.5	81	7.00	15.80	998	537	1,535	115	.....	97	.....	1,825	42	725	1,200
Stearman Aircraft Co	80	504	.....	OBL	2	Pwj	420	S.L.	2,200	104	650	.....	102	12.72	8.33	2,380	1,120	3,500	175	S.L.	151	S.L.	1,850	58	1,600	19,600
Stinson Aircraft Corp	O	22	.....	OML	2	Ly	220	S.L.	2,050	50	400	15.0	99	12.30	12.00	1,895	710	2,605	126	S.L.	113	S.L.	1,850	51	1,050	16,700
Taylor Aircraft Co	H-2	Pdg	.....	O-CML	2	Sz	35	S.L.	1,750	9	175	3.5	74	5.20	27.00	545	405	950	90	S.L.	80	S.L.	1,500	38	650	12,000
Taylor Aircraft Co	E-2	45	1,42	O-CML	2	Con	38	S.L.	2,600	9	225	3.0	69	5.10	25.00	532	400	932	85	S.L.	75	S.L.	2,300	38	500	12,000
Taylor Aircraft Co	F-2	*52	1,49	O-CML	2	Aero	40	S.L.	2,050	9	175	3.5	74	5.20	23.80	545	405	950	92	S.L.	85	S.L.	1,850	38	750	14,000
Viking Flying Boat Co	Kitty Hawk B-8	*39	.....	OFL	3	K	125	S.L.	1,900	35	425	7.5	98	8.37	15.60	1,178	772	1,950	106	S.L.	90	S.L.	1,750	40	700	12,000
Waco Aircraft Co	UMF	*54	5,630	OFL	3	Con	210	S.L.	2,000	50	512	12.0	102	10.70	11.90	1,485	1,015	2,500	143	S.L.	128	S.L.	1,900	47	1,100	14,500
Waco Aircraft Co	YMF	54	5,895	OBL	3	Ja	225	S.L.	2,000	50	516	12.0	102	10.70	11.10	1,540	960	2,500	147	S.L.	129	S.L.	1,900	47	1,250	16,000
Waco Aircraft Co	S3-HD	54	16,100	O-CBL	2	Pwj	400	S.L.	2,200	90	650	24.0	105	13.30	8.10	2,300	1,100	3,400	195	S.L.	166	S.L.	1,950	60	1,750	21,000
SINGLE ENGINED PLANES WITH SEATS FOR MORE THAN THREE PERSONS																										
Aircraft Mechanics, Inc	C-7	318	.....	CML	4	Wr Ww	175	.....	45	450	.....	12.0	96	13.30	15.80	1,720	1,060	2,780	142	.....	121	.....	.....	47	700	17,000
Airplane Development Corp	Vultee V-1A	545	.....	CML	9-10	Wr Cy	735	4,100	1,950	206	1,000	45.0	120	22.10	11.55	5,307	3,193	8,500	225	4,100	205	7,000	1,750	63	1,000	20,000

Beech Aircraft Co	B-17-L	*560	8,550	CBL	4-5	Ja	225	S.L.	2,000	50[3]	550	12.5	90	11.50	14.00	1,800	1,350	3,150	175	S.L.	152	S.L.	1,900	45	1,000	18,000
Beech Aircraft Co	B-17-E	*Apl	12,980	CBL	4-5	Wr Ww	285	S.L.	2,100	70[4]	700	17.0	97	13.48	12.63	2,000	1,600	3,600	185	S.L.	165	S.L.	1,900	50	1,200	20,000
Beech Aircraft Co	17-R	496	17,930	CBL	4	Wr Ww	420	S.L.	2,150	145	1,000	23.5	102	14.00	10.70	2,700	1,800	4,500	195	S.L.	165	S.L.	1,900	55	1,750	17,500
Beech Aircraft Co	A-17-F	548	24,500	CBL	4	Wr Cy	690	S.L.	1,950	155	750	42.0	114	16.10	7.50	3,285	1,915	5,200	225	S.L.	210	4,000	1,900	61	2,500	25,000
Bellanca Aircraft Corp	Sr. Passenger		10,500	CML	6	Wr Ww	420	S.L.	2,150	175	1,350	.....		17.20	12.70	3,000	2,350	5,350	165	S.L.	155	12,000	.....	54	900	18,000

Beech Aircraft Co.	B-17-L		*560	8,550	CBL	4–5	Ja	225	S.L.	2,000	50[3]	550	12.5	90	11.50	14.00	1,800	1,350	3,150	175	S.L.	152	S.L.	1,900	45	1,000	18,000
Beech Aircraft Co.	B-17-E		*Apl	12,980	CBL	4–5	Wr Ww	285	S.L.	2,100	70[4]	700	17.0	97	13.48	12.63	2,000	1,600	3,600	185	S.L.	165	S.L.	1,900	50	1,200	20,000
Beech Aircraft Co.	17-R		496	17,930	CBL	4	Wr Ww	420	S.L.	2,150	145	1,000	23.5	102	14.00	10.70	2,700	1,800	4,500	195	S.L.	165	S.L.	1,900	55	1,750	17,500
Beech Aircraft Co.	A-17-F		548	24,500	CBL	4	Wr Cy	690	S.L.	1,950	155	750	42.0	114	16.10	7.50	3,285	1,915	5,200	225	S.L.	210	4,000	1,900	61	2,500	25,000
Bellanca Aircraft Corp.	Sr. Pacemaker			19,500	CML	6	Wr Ww	420	S.L.	2,150	175	1,350	.....	.....	17.20	12.70	3,000	2,350	5,350	165	S.L.	155	12,000	.....	54	900	18,000
Bellanca Aircraft Corp.	Sr. Skyrocket		*	21,950	CML	6	Pww	550	5,000	2,200	200	1,280	.....	.....	18.00	10.20	3,150	2,450	5,600	190	7,000	175	12,000	.....	57	1,240	25,000
Bellanca Aircraft Corp.	Aircruiser Cargo		.....	32,950	CQL	25	Wr Cy-G	715	7,000	1,950	200	710	.....	150	17.20	14.50	6,170	5,230	11,400	165	7,000	155	7,000	.....	65	500	20,000
Bellanca Aircraft Corp.	Aircruiser Transport		.....	34,750	CQL	12-15	Wr Cy-G	715	7,000	1,950	200	710	.....	150	16.90	15.16	5,983	4,870	10,853	165	7,000	155	12,000	.....	64	700	20,000
Cessna Aircraft Co.	C-34		Pdg	.....	CML	4	War	145	.....	.....	35	.....	.....	.....	12.18	15.17	1,220	980	2,200	162	.....	143	.....	.....	47	1,000	18,900
Fairchild Aircraft Corp.	C-9		.....	.....	CML	5	Ja	225	S.L.	2,000	60	600	15.6	90	14.75	15.00	2,156	1,444	3,600	168	S.L.	154	S.L.	1,900	48	640	13,500
Kinner Airplane & Motor Corp., Ltd.	C-7		532	12,800	CML	4	K	300	.....	1,800	90	625	20.0	108	19.80	13.30	2,551	1,449	4,000	165	.....	150	.....	1,620	55	1,100	18,000
Laird Airplane Co.	LC-EW-450		Pdg	25,000	CQL	6	Pww	450	5,000	2,000	150	850	30.0	108	21.30	11.90	3,205	2,145	5,350	200	5,000	175	5,000	.....	58	2,000	21,000
Lockheed Aircraft Corp.	Vega 5-C		308	17,500	CML	7	Pww	450	6,000	2,100	96	660	27.0	108	17.02	10.55	2,850	1,900	4,750	190	6,000	180	11,000	1,900	61	1,300	18,500
Lockheed Aircraft Corp.	Orion 9-D		508	25,000	CML	7	Pww	550	5,000	2,200	116	720	33.0	108	19.72	10.54	3,640	2,160	5,800	225	5,000	205	11,500	2,000	63	1,400	24,500
Northrop Corp.	Delta 1-D		553	.....	CML	5-7	Wr Cy [10]	710	4,000	1,950	328	1,600	43.0	114	20.20	10.20	Var	Var	7,350	216	4,000	192	13,000	1,850	62	1,200	22,000
Stinson Aircraft Corp.	SR-5A		*	6,550	CML	4	Ly	245	S.L.	2,300	75	600	15.0	99	15.40	14.50	2,310	1,240	3,550	133	S.L.	120	S.L.	1,950	55	850	14,500
Waco Aircraft Co.	UKC-S		*528	5,225	CBL	4	Con	210	S.L.	2,000	50	492	12.0	102	12.50	14.30	1,720	1,280	3,000	138	S.L.	123	S.L.	1,900	53	750	13,000
Waco Aircraft Co.	YKC-S		533	5,490	CBL	4	Ja	225	S.L.	2,000	50	500	12.0	102	12.50	13.30	1,773	1,227	3,000	143	S.L.	125	S.L.	1,900	53	800	15,000
Waco Aircraft Co.	CJC-S		538	7,000	CBL	4	Wr Ww	250	S.L.	2,000	70	580	15.0	108	12.10	12.80	1,941	1,359	3,200	147	S.L.	129	S.L.	1,900	52	850	16,000
Waco Aircraft Co.	UOC		*	6,630	CBL	4	Con	210	S.L.	2,000	50	465	14.0	102	12.98	14.76	1,880	1,220	3,100	151	S.L.	133	S.L.	1,900	53	920	15,300
Waco Aircraft Co.	YOC		*	6,895	CBL	4	Ja	225	S.L.	2,000	50	480	14.0	102	12.98	13.78	1,900	1,200	3,100	155	S.L.	137	S.L.	1,900	53	1,000	16,000
Waco Aircraft Co.	CUC		*	8,400	CBL	4	WrWw	250	S.L.	2,000	70	650	15.0	105	13.40	12.80	1,990	1,210	3,200	162	S.L.	145	S.L.	1,900	55	1,070	17,000

MULTI-ENGINED TRANSPORT PLANES

Bellanca Aircraft Corp.	Aircruiser (2 eng.)		*	57,750	CQL	18	2 Wr Cy-G	1,430	7,000	1,900	300	750	.....	144	21.70	10.10	8,402	6,020	14,422	190	7,000	170	12,000	.....	57	1,500	27,000
Boeing Aircraft Co.	247-D		558	.....	CML	12	2 Pww-G	1,100	8,000	2,200	273	745	66.0	120	16.30	12.40	8,940	4,710	13,650	200	8,000	180	8,000	2,000	62	1,150	25,400
Curtiss-Wright Airplane Co.	AT-32		534	.....	CBL	[11]	2 Wr Cy-G	1,420	7,000	1,950	350	650	86.0	138	14.50	12.20	11,465	6,035	17,500	190	8,000	167	8,000	1,750	62	1,200	23,000
Douglas Aircraft Co., Inc.	DC-2		[13]540	.....	CML	16	[12]	1,420	7,000	1,950	510	1,225	80.0	132	19.40	12.80	12,000	6,200	18,200	210	8,100	196	12,500	1,850	60	1,090	23,200
Allan H. Lockheed	Alcor Duo-6		.....	.....	CML	8	2-Men[6]	420	S.L.	.....	110	660	24.0	.....	18.20	12.10	2,885	2,205	5,090	190	.....	160	.....	.....	57	1,400	20,000
Lockheed Aircraft Corp.	Electra 10-A		551	50,000	CML	12	2 Pwj	800	5,000	2,200	200	850	42.0	108	21.27	12.19	6,205	3,545	9,750	210	5,000	195	11,400	2,000	63	1,140	21,650
Lockheed Aircraft Corp.	Electra 10-B		Pdg	50,000	CML	12	2 Wr Ww	840	S.L.	2,200	200	800	42.0	108	21.27	11.61	6,205	3,545	9,750	205	S.L.	190	5,000	2,000	63	1,175	18,750
Lockheed Aircraft Corp.	Electra 10-C		559	50,000	CML	12	2-Pw	900	6,000	2,100	260	875	47.0	108	22.47	11.44	6,710	3,590	10,300	207	6,000	194	12,000	1,900	65	1,050	22,750
Stinson Aircraft Corp.	A		556	37,500	CML	10	3 Ly	780	S.L.	2,300	160	640	40.0	99	20.20	13.00	7,020	3,080	10,100	.....	.....	163	5,000	1,800	64	1,050	17,500
Upperco-Burnelli Corp.	UB-14-A		.....	50,000	CML	14	2 Pwh	1,350	6,000	2,050	270	500	108.0	120	20.40	10.20	8,400	5,600	14,000	225	6,000	205	6,000	1,950	65	1,180	19,000

AMPHIBIANS AND FLYING BOATS

Amphibions, Inc.	P-3-C		.....	10,000	CMA	3	Con	210	S.L.	2,000	56	400	14.0	102	14.30	15.24	2,230	970	3,200	115	S.L.	100	S.L.	1,900	55	750	11,000
Curtiss-Wright Airplane Co.	CA-1		.....	.....	CBA	5	Wr Ww	365	S.L.	2,100	80	500	20.0	110	14.00	12.85	3,100	1,600	4,700	150	S.L.	126	S.L.	1,875	60	850	13,000
Douglas Aircraft Co., Inc.	Dolphin		2-479	.....	CMA	8	Pww	900	10,500	2,200	252	720	54.0	108	16.00	10.60	6,730	2,770	9,500	156	10,500	135	10,500	1,910	64	750	19,800
Douglas Aircraft Co., Inc.	Dolphin		2-487	.....	CMF	8	Pww	900	10,500	2,200	252	780	54.0	108	16.00	10.60	6,195	3,405	9,500	167	10,500	145	10,500	1,910	64	770	20,600
Glenn L. Martin Co.	130		.....	.....	CMF	52	4 Pww-G[1]	3,200	7,000	2,400	4,000	4,000	.....	138	22.00	15.90	23,000[7]	28,000	51,000	180	8,000	155	.....	2,180	70	980	18,000
Seversky Aircraft Corp.	Sev-3M		.....	.....	CMA	2-3	Wr Ww	420	S.L.	.....	130	1,000	.....	105	18.10	10.00	2,545	1,655	4,200	185	2,200	160	1,900	.....	55	1,100	16,000
Sikorsky Aircraft Corp.	S-43		.....	.....	CMA	18	2-Pwh	1,500	.....	2,250	400	750	89.0	138	22.63	11.70	9,821	Var	17,541	186	.....	167	.....	.....	65	1,250	23,500
Sikorsky Aircraft Corp.	S-42-A		544	.....	CMF	37	4-Pwh	3,000	.....	2,250	1,240	1,200	165.0	138	28.58	12.67	19,764	Var	38,000	180	.....	160	.....	.....	65	1,000	16,000
Viking Flying Boat Co.	V-2		361	.....	OBF	4	Wr Ww	240	S.L.	2,000	60	400	12.0	102	8.60	13.80	2,300	1,150	3,450	105	S.L.	90	S.L.	1,750	45	750	14,000

AUTOGIROS

Kellett Autogiro Corp.	KD-1[8]		.....	.....	OL	2	Ja	225	S.L.	2,000	49	361	15.0	102	[9]1.65	9.20	1,375	700	2,075	125	S.L.	103	S.L.	1,600	10	1,400	.....
Pitcairn Autogiro Co.	PA-33[8]		.....	.....	OL	2	Wr Ww	420	S.L.	2,150	66	337	22.2	108	[9]1.91	7.62	2,300	900	3,200	142	S.L.	114	S.L.	1,725	....	1,485	15,275

A	—Amphibian	C	—Closed	Do	—Douglas	Id	—Inverted	Mech	—Mechanical	Pnd	—Pneudraulic	Sc	—Shock Cord	Ss	—Ssekely
Acp	—Aircraft Prod	Ca	—Cable	Du	—Dual	In	—Internal	Men	—Menasco	Pr	—Push Rod	Scd	—Screwed	T	—Tubing
AD	—Alclad	Can	—Cantilever	En	—Ensign	Ja	—Jacobs	Mg	—Mahogany	Pwh	—P & W Hornet	Sd	—Stamped	Tred	—Treadle
Aer	—Aerol	Cd	—Cord	Ex	—Extra	K	—Kinner	Mo	—Monocoque	Pwj	—P & W Wasp Jr.	Se	—Security	Trs	—Truss
Aero	—Aeromarine	Cg	—Corrugated	F	—Flying boat	L	—Landplane	Mul	—Multiple	Pww	—P & W Wasp	Sh	—Sheet	W	—Wood
Al	—Aluminum	Cir	—Cirrus	Fab	—Fabric	Lam	—Lambert	Na	—Nailed	Q	—Sesquiplane	Sk	—Skid	War	—Warner
Apl	—Applied for	Com	—Compression	G	—Glued	Lb	—Le Blond	O	—Open	R	—Rubber	Sl	—Streamline	Wb	—Wire Braced
Aut	—Autofan	Con	—Continental	Gen	—General	Lk	—Lockheed	Ol	—Oleo	Ran	—Ranger	Sol	—Solid	Wh	—Wheel
Aw	—Air Wheels	Cont	—Continuous	Go	—Goodyear	Lmd	—Laminated	Old	—Oildraulic	Ret	—Retractable	Sp	—Spruce	Wi	—Wire
Bi	—Biplane	Cs	—Coiled Springs	Gy	—Gipsy	Lp	—Low pressure	Op	—Optional	Ro	—Routed	Spl	—Split Axle	Wl	—Welded
Bo	—Bolted	Cu	—Curtiss	Ht	—Heat treated	Ly	—Lycoming	Pe	—Pedal	Rv	—Riveted	Spr	—Spring	Wp	—Wiley Post
Box	—Box spar	Cv	—Conventional	Hyd	—Hydraulic	M	—Monoplane	Ply	—Plywood	S	—Steel	St	—Standard	Wr	—Wright
Bx	—Bendix	D	—Aluminum alloy	I	—"I" section	Me	—Metal	Pn	—Pneumatic	SS	—Stainless Steel	Str	—Straight Axle	Ww	—Whirlwind

Foot Notes: *Available also as a Float type seaplane. [1]—twin row. [2]Three place. [3]Standard, 70 gal, special. [4]Standard, 95 or 120 gal. special. [5]Cargo carrier. [6]Engines mounted horizontally. [7]As a mail plane. [8]Wingless type. [9]Disc loading. [10]Available with F2 or F3 Cyclone. [11]Available as 15 pass. day plane or 12 passenger convertible sleeper (plus crew of 3). [12]Available with 2 Wright Cyclones or 2 P. & W. Hornets. [13] Also 2-495.

American airplane specifications (continued)

AVIATION does not assume responsibility for the figures given

Manufacturer and Designation	A. T. C. Numbers	General (†)			Area (Sq. ft.) (†)						Wings					Landing Gear (†)						Fuselage or Hull			
											Spars		Ribs									Framework			
		Span	Length overall	Height overall	Wing	Ailerons	Fin	Rudder	Stabilizer	Elevators	Material	How fabricated	Material	How fabricated	Covering Material	Type	Tread (in.)	Wheel type and size	Brakes	Shock unit landing gear and tail	Tail wheel or skid	Material	How fabricated	Covering Material	Baggage wt. allowance (lb.)
SINGLE ENGINED PLANES WITH SEATS FOR FEWER THAN FOUR PERSONS																									
Aeronautical Corp. C-3	396	36′ 0″	20′ 0″	7′ 6″	142.2	15.7	6.7	9.3	14.9	12.3	Sp	Sol	Sp	Trs	Fab	Spl	64	Go 16x7-3	Go	Ol	Sk	ST	Wl	Fab	20
Aircraft Mechanics D-1, D-2	449	37′ 9″	21′ 7″	5′ 8″	175.0	20.0	6.5	.....	18.8	13.0	W	Sol	W	Trs	Fab	Spl	54	Aw 16x7-3	No	.....	Sk	ST	Wl	Fab	3
Aircraft Mechanics A-14	2-103	36′ 8″	25′ 8″	9′10″	330.0	43.0	4.3	.....	23.8	16.8	W	I	W	Trs	Fab	Spl	72	Bx 30x5	Bx	Sc	Sk	ST	Wl	Fab	.....
Am. Eagle-Lincoln Aircraft Corp. B-32	450	34′ 4″	21′ 7″	8′ 0″	164.4	17.8	4.4	6.6	12.9	12.1	Sp	Sol	Sp	G	Fab	Spl	65	Aw 700x4	No	Sc	Sk	ST	Wl	Fab	.....
Bellanca 28-70		46′ 4″	25′11″	8′ 8″	278.8	22.2	12.2	10.5	26.2	17.8	Sp	Ro	Ply	G,Na	Fab	Ret	179	Bx 32x6	Bx	Ol	Wh	ST	Wl	Fab	.....
Consolidated Fleet 10, 11	374, 526	28′ 0″	21′ 0″	7′10″	196.0	10.9	2.9	8.2	13.1	10.8	Sp	Lmd	D	Rv	Fab	Spl	77	Aw 850x10	Yes	Ol,Spr	Sk	ST	Wl	Fab	40-55
Consolidated PT-11C		31′ 6″	26′ 9″	9′ 4″	280.5	26.2	4.1	12.3	23.8	13.4	Sp	Lmd	D	Sd	Fab	Spl	86	9.50x12	Aut	Ol,Spr	Wh	ST	Wl	Fab	50
Cunningham-Hall GA-21		30′ 0″	19′ 8″	6′ 6″	130.0	22.5	6.4	6.8	16.0	12.9	ST	Bo,Trs	DT	Rv	D,Fab	Ret[1]	78	Aut 6.50x10	Aut	Aer	Wh	D	Rv	D	170
Curtiss-Wright Sport 16-E	463	28′10″	21′ 1″	8′10″	206.0	17.6	5.0	7.7	18.5	12.7	Sp	Sol	Sp	Trs	Fab	Spl	76	Aw 6.5x10	Acp	Hyd	Wh	ST	Wl	Fab	.....
Curtiss-Wright Speedwing A-14D, B-14B	442, 485	31′ 0″	23′ 7″	9′10″	248.0	21.5	5.4	10.4	19.1	11.9	Sp	Sol	Sp	Trs	Fab	Spl	81	8.5x10	Acp	Hyd	Wh	ST	Wl	Fab	.....
Curtiss-Wright Speedwing D-14-R		31′ 0″	23′ 2″	9′ 2″	248.0	21.5	5.4	10.4	19.1	11.9	Sp	Sol	Sp	Trs	Fab	Spl	96	8.5x10	Acp	Hyd	Wh	ST	Wl	Fab	116
Fairchild C-7-D	503	32′10″	21′ 8″	7′10″	170.0	29.0	4.1	6.0	15.8	10.4	Sp	I	Sp	Trs	Fab	Spl	91	War 6.50x10	War	Ol,Spr	Sk	ST	Wl	Fab	74
Fairchild C-7-G		33′ 0″	22′ 3″	7′11″	173.0	17.0	4.1	9.4	15.8	10.4	Sp	Ro,I	Sp	Trs	Fab	Spl	95	War 6.50x10	War	Ol,Spr	Wh	ST	Wl	Fab	100
Fairchild C-8-C, D		36′ 4″	23′ 9″	7′ 3″	186.0	17.0	4.1	9.4	16.0	13.9	Sp	Ro,I	Sp	Trs	Fab	Spl	111	War 6.50x10	War	Ol,Spr	Wh	ST	Wl	Fab	150
Granville, Miller & De Lackner Q.E.D.		34′ 3″	27′ 3″	9′ 3″	211.0	18.8	3.6	11.0	22.0	18.0	Sp	Sol	Ply	G	Ply	Wb	76	Bx 31 in.	Bx	Bx	Sk	ST	Wl	Fab	100
Great Lakes 2T-1A	228	27′ 8″	20′ 4″	8′ 5″	187.6	13.5	5.9	6.8	15.4	10.7	Sp	Ro	D	Sd	Fab	Spl	70	Aw 22x10	Yes	.....	Sk	ST	Wl	Fab	.....
International CNA-40	495	26′10″	17′ 3″	4′ 6″	107.0	25.0	4.3	5.2	10.0	8.9	Sp	Sol	Sp	Trs	Fab	Spl	48	Int 16x4	Op	Sc-Spr	Sk	ST	Wl	Fab	.....
International LNA-40, LNB-4	487, 456	31′ 3″	17′ 3″	6′ 2″	135.5	33.6	4.9	5.2	10.0	8.9	Sp	Sol	Sp	Trs	Fab	Spl	48	Int 16x4	Op	Sc-Spr	Sk	ST	Wl	Fab	7-16
Kinner K, B	490, 516	39′ 0″	24′ 2″	7′ 2″	202.0	20.3	7.2	9.8	18.6	15.6	Sp	Sol	Sp	Trs	Fab	Spl	97	Aw 19x9x3	Go	K	Wh	ST	Wl	Fab	74-156
Kinner B-2	522	34′ 6″	24′ 2″	7′ 2″	174.3	18.3	7.2	9.8	18.6	15.6	Sp	Sol	Sp	Trs	Fab	Spl	74	Aut 6.50x10	Go	K	Wh	ST	Wl	Fab	58
Kinner R	554	32′ 8″	24′ 2″	7′ 9″	163.8	14.8	7.2	9.8	18.6	15.6	Sp	Sol	Sp	Trs	Fab	Wb	84	Aut 6.50x10	Aut	K	Wh	ST	Wl	Fab	100
Laird LC-B, LC-1B	Apl, 353	33′ 6″	24′ 7″	9′ 3″	295.0	.....	.....	13.0[2]	.....	36.0[2]	Sp	Sol	Ply	Trs	Fab	Spl	108	Sl 27″	Bx	Sc	Wh	DT	Rv	Fab	50
Laird LC-R, LC-RW	176, 377	28′ 0″	22′ 9″	9′ 0″	202.0	.....	.....	.....	.....	.....	Sp	Sol	Ply	Trs	Fab	Spl	...	30x5	Yes	.....	Op	DT	Rv	Fab	50
Laird LC-RW 450	Pdg	30′ 6″	22′ 8″	9′ 6″	216.0	.....	.....	13.0[2]	.....	26.0[3]	Sp	Sol	Ply	Trs	Fab	Spl	96	Bx 32x6	Bx	Ol	Sk	DT	Rv	Fab	50
Lockheed Altair 8E, 8D	357, 461	42′ 9″	28′ 4″	9′ 3″	294.1	22.4	11.0	12.8	38.0	21.6	Sp	G	Sp	G,Na	Ply	Ret	139	Aut 27″ Sl	Aut	Pn	Wh	Sp	G	Ply	Var
Monocoupe 90, 90-A	306	32′ 0″	20′10″	6′11″	132.3	15.5	4.1	5.8	10.6	9.2	Sp	Sol	Sp	G	Fab	Wb	63	Acp 6.50x10	Acp	Old, Sc	Sk	ST	Wl	Fab	.....
Northrop Gamma 2-D	549	47′10″	31′ 2″	8′ 8″	363.0	23.5	8.4	11.4	37.6	18.7	D	Mul	D	....[4]	D	Can	108	36x8	Bx	Bx,Aer	Wh	D,Mo	Rv	D	900
Porterfield 35-70	498	32′ 0″	20′ 3″	6′ 6″	153.2	17.2	5.2	6.3	13.2	9.6	Sp	Sol	Ply	G,Na	Fab	Spl	66	Aw 16x7.00-4	Op	Sc	Op	ST	Wl	Fab	25
Wiley Post A	561	28′ 6″	19′ 9″	7′ 9″	206.0	18.3	4.3	5.9	13.8	12.2	Sp	Sol	Ply	.....	Fab	Spl	72	Aw 16x7-3	No	Sc	Sk	ST	Wl	Fab	.....
Rearwin 4000	469	36′ 0″	21′ 6″	7′ 3″	179.0	.....	.....	.....	.....	.....	Sp	Sol	Sp	.....	Fab	Spl	72	700x4	Op	R	Sk	ST	Wl	Fab	10
Rearwin 7000		35′ 0″	22′ 0″	6′ 0″	166.0	.....	.....	.....	.....	.....	Sp	Sol	Sp	.....	Fab	Spl	70	700x5	Op	Spr,Ol	Sk	ST	Wl	Fab	50
Rearwin 6000		32′ 0″	21′ 5″	6′ 5″	145.0	13.1	5.8	5.7	17.0	9.2	Sp	Sol	Sp	.....	Fab	Can	68	700x5	Aut	R	Wh	ST	Wl	Fab	50
Ryan S-T	541	29′11″	21′11″	6′11″	124.0	11.4	4.5	7.2	12.0	10.0	Sp	Sol	D	Sd	Fab	Tred	78	Aw 18x8.5	Go	Ol	Wh	D,Mo	Rv	AD	50
Security Airster	521	40′ 0″	23′11″	7′ 9″	240.0	26.2	8.2	9.0	21.8	16.5	W	Ro	W	G,Na	Fab	Spl	99	6.50x10	Aut	Se	Wh	ST	Wl	Fab	50
Skylark 3-95		28′ 4″	22′10″	8′ 0″	185.6	19.4	3.8	7.3	13.8	10.8	W	Sol	D	Sd	Fab	Spl	60	Aw 6.50x10	Aut	Ol,R	Op	ST	Wl	Fab	50
Stearman 80	504	35′ 0″	25′ 1″	9′ 8″	275.0	22.4	5.7	10.7	26.7	12.9	Sp	Lmd	Sp	Trs	Fab	Wb	87	Gen 24	Bx	Ol,Spr	Wh	ST	Wl	Fab	96
Stinson O		40′ 0″	27′ 0″	9′ 3″	215.0	25.4	7.8	12.0	28.7	17.1	Sp	.....	DT	Rv	Fab	Can	111	8.50x10	Aut	Aer	Wh	ST	Wl	Fab	.....
Taylor H2, E2, F2	Pdg, 455, 525	35′ 3″	22′ 3″	6′ 8″	183.0	16.0	3.0	7.0	18.0	11.0	Sp	Sol	Me	Rv	Fab	Spl	52	7.00x4	No	Sc	Sk	ST	Wl	Fab	5
Viking Kitty Hawk B-8	392	28′ 4″	22′ 6″	8′ 8″	233.0	22.3	5.7	6.4	24.0	12.8	Sp	Ro	Sp	Trs	Fab	Spl	86	War 6.50x10	War	Ol	Wh	ST	Wl	Fab	30
Waco UMF, YMF	546, 542	30′ 0″	23′ 2″	8′ 5″	233.5	.....	.....	.....	.....	.....	Sp	.....	Ply	.....	Fab	Spl	75	Aut 7.50x10	Aut	Ol	Wh	ST	Wl	Fab	85
Waco 83-HD	543	32′ 9″	25′ 1″	9′ 6″	256.3	.....	.....	.....	.....	.....	Sp	.....	Ply	.....	Fab	Spl	85	Aut 8.50x10	Aut	Ol	Wh	ST	Wl	Fab	100
SINGLE ENGINED PLANES WITH SEATS FOR MORE THAN THREE PERSONS																									
Aircraft Mechanics, Inc. C-7	318	36′ 0″	26′10″	7′ 9″	208.0	.....	.....	.....	.....	.....	W	Box	W	Trs	Fab	Ret	72	Bx 24x4	Yes	Ol	.....	ST	Wl	Fab	100
Airplane Develop. Corp. Vultee V-1A	545	50′ 0″	37′ 0″	10′ 2″	384.0	22.7	9.9	14.1	38.6	32.5	AD	Trs	AD	Rv.	AD	Ret	145	Aw 30x13	Go,Hyd	Ol	Wh	AD	Rv	AD	144
Beech B 17-L	560	32′ 0″	24′ 5″	8′ 6″	273.0	23.8	5.5	8.7	23.8	15.1	Sp	Sol	Sp	Trs	Fab	Ret	86	Aut 24″ Sl	Aut	Ol,Spr	Wh	ST	Wl	Fab	120
Beech B 17-E	Apl	32′ 0″	24′ 8″	8′ 1″	267.0	20.8	5.5	8.6	23.7	16.4	Sp	Sol	Sp	Trs	Fab	Ret	86	Aut 24″ Sl	Aut	Ol,Spr	Wh	ST	Wl	Fab	120
Beech 17-R, A 17-F	496, 548	34′ 6″	24′ 2″	8′10″	322.0	24.0	7.5	8.0	26.4	15.6	ST[5]	Wl	Sp	Ply	Fab	Ret[1]	86	Aut 7.50x12	Aut	Ol,Spr	Wh	ST	Wl	Fab	120
Bellanca, Sr. Pacemaker, Sr. Skyrocket		50′ 6″	27′11″	8′ 6″	311.0	30.4	16.2	12.4	38.6	23.4	Sp	Sol,Ro	Ply	G,Na	Fab	Can	97	Bx 31″ Sl	Bx	Ol	Wh	ST	Wl	Fab	215
Bellanca Aircruiser C. and Tr		55′ 0″	42′ 3″	12′ 0″	664.0	46.4	20.7	20.5	59.6	30.0	Sp	Sol,Ro	SS	Wl	Fab	.....	216	Go 36x16	Go,Aw	Ol	Wh	ST	Wl	Fab	....[13]
Cessna C-34	Pdg	33′10″	24′ 7″	.....	180.0	.....	.....	.....	.....	.....	Sp	Lmd	Sp	.....	Fab	Can	.....	Aut, Gen, Sl	Aut	Ol,Spr	Wh	ST	Wl	Fab	.....
Fairchild C-9		39′ 6″	28′11″	8′ 0″	244.0	17.3	7.6	11.4	22.6	16.4	D,Sp	I,Box	D,Sp	I,Trs	D,Fab	Ret	104	Aut 7.50x10	Aut	Ol,Spr	Wh	ST	Wl	Fab	200
Kinner C-7	532	39′ 9″	28′ 7″	8′ 8″	202.0	21.7	7.5	11.8	22.3	15.9	Sp	Sol	Sp	Trs	Fab	Wb	91	Aut 8.50x10	Aut	K	Wh	ST	Wl	Fab	100
Laird LC-EW 450	Pdg	38′ 0″	27′ 6″	8′ 8″	250.0	24.0	9.0	7.2	22.7	18.0	Sp,ST	Sol,Wl	W,D	G,Na	Fab	Can	106	27″ Sl	Bx	Ol,Pn	Wh	D,Mo	Rv	D	150
Lockheed Vega 5C	308	41′ 0″	27′ 6″	9′ 0″	279.1	22.4	12.5	10.2	31.5	16.0	Sp	Box,G	Sp	G	Ply	Spl	99	War 9.50x12	War	Hyd	Wh	Sp,Mo	G	Ply	150
Lockheed Orion 9D	508	42′ 9″	28′ 4″	9′ 8″	294.1	22.4	11.0	12.8	38.0	21.6	Sp	G	Sp	G	Ply	Ret	139	Aut 27″ Sl	Aut	Aer	Wh	Sp,Mo	G	Ply	152
Northrop Delta 1-D	553	47′10″	33′ 1″	9′10″	363.0	23.5	11.6	11.3	37.0	18.7	D	Mul	D	....[4]	D	Can	108	36x8	Bx,Hyd	Bx,Aer	Wh	D,Mo	Rv	D	Var
Stinson SR-5A		41′ 0″	27′ 2″	8′ 6″	230.0	28.2	10.6	13.7	26.3	17.1	Sp	.....	DT	Rv	Fab	Can	118	Aw 25x11-4	Go,Hyd	Pn	Wh	ST	Wl	Fab	95
Waco UKC-S, YKC-S	528, 533	32′ 3″	25′ 3″	8′ 6″	240.0	.....	.....	.....	.....	.....	Sp	.....	Ply	.....	Fab	Spl	84	Aut 7.50x10	Aut	Ol	Wh	ST	Wl	Fab	100
Waco CJC-S	538	34′10″	25′ 7″	8′10″	264.3	.....	.....	.....	.....	.....	Sp	.....	Ply	.....	Fab	Spl	85	Aut 8.50x10	Aut	Ol	Wh	ST	Wl	Fab	100
Waco UOC, YOC, CUC		35′ 0″	25′ 4″	8′ 1″	238.8	.....	.....	.....	.....	.....	Sp	.....	Ply	.....	Fab	Spl	86	Aut 7.50x10	Aut	Ol	Wh	ST	Wl	Fab	100

MULTI-ENGINED TRANSPORT PLANES

Waco CJC-S	538	34′10″	25′ 7″	8′10″	264.3						Sp		Ply		Fab	Spl	85	Aut 6.50x10	Aut	Ol	Wh	ST	Wl	Fab	100
Waco UOC, YOC, CUC		35′ 0″	25′ 4″	8′ 1″	238.8						Sp		Ply		Fab	Spl	86	Aut 7.50x10	Aut	Ol	Wh	ST	Wl	Fab	100
MULTI-ENGINED TRANSPORT PLANES																									
Bellanca Aircruiser (2 eng.)		65′ 0″	45′ 0″	12′ 0″	664.0	55.6	24.7	30.7	75.1	37.7	Sp	Ro	SS	Wl	Fab		216	Go A.v 40x18	Go,Aw	Ol	Wh	ST	Wl	Fab	980
Boeing 247-D	558	74′ 0″	51′ 7″	12′ 2″	836.1	60.8	17.6	27.9	82.8	47.7	D,S	Rv,Bo	D	Rv	D	Ret	207	Go 42x15.00-16	Hyd	Ol	Wh	D	Rv	D	882
Curtiss-Wright AT-32	534	82′ 0″	48′ 7″	16′ 4″	1208.0	138.8	28.5	42.5	101.2	82.6	ST	Wl	D	Rv	Fab	Ret	243	Bx 15.00x16	Mech	Ol,Spr	Wh	ST	Wl	Fab	450
Douglas DC-2	540, 2-495	85′ 0″	62′ 0″	21′ 1″	939.0	86.8	22.6	42.5	42.2	58.6	AD	Rv	AD	Sd	AD	Ret	216	Bx 42x15.00x16	Bx,Hyd	Bx	Wh	D	Rv	AD	475
Allan H. Lockheed, Alcor Duo-6		42′ 0″	28′ 0″		280.0											Spl				Hyd	Wh	Sp,Mo	G	Ply	
Lockheed Electra 10A, 10B, 10C	551, Pdg, 559	55′ 0″	38′ 7″	10′ 1″	458.3	29.2	17.7	19.5	53.6	34.5	AD	Rv	AD	Rv	AD	Ret	163	Go Aw 35x15-6	Go,Hyd	Aer	Wh	AD	Rv	AD	500
Stinson A	556	60′ 0″	36′10″	11′ 6″	500.0	53.5		35.0[2]		105.0[3]	ST	Wl	DT	Rv	Fab,D	Ret	204	Go 35-15x6.00	Go	Aer	Wh	ST	Wl	Fab	500–800
Upperen Burnelli UB-14-A		71′ 2″	42′ 7″	10′ 0″	†686.0[6]	55.0	13.3	21.8	61.7	47.5	D	Rv	D	Trs	D	Ret	122	Aut 12.5x14	Aut,Hyd	Ol,Spr	Wh	D	Rv	D	1000
AMPHIBIANS AND FLYING BOATS																									
Amphibions P-3-C		42′ 6″	30′ 4″	12′ 0″	224.0	22.4	12.0	11.6	18.0	18.0	Sp	Ro	SS	Wl	Fab	Ret	122	Aw 8½x10	Aut,Hyd	Ol	Wh	ST	Wl	Fab,D	70
Curtiss-Wright CA-1		40′ 0″	31′ 0″	12′ 2″	335.0	51.0	27.8	11.6	30.3	16.8	Sp	Sol	Sp	Trs	Fab	Ret	67	Aut Sl 27″	Aut		Wh	AD	Rv	AD	120
Douglas Dolphin (Amphib.)	2-479	60′ 0″	45′ 2″	17′ 1″	592.0	46.1	29.8	17.4	48.5	37.4	Sp	Box	Sp	Trs	Ply	Hyd	156	Bx 36x8	Bx,Mech	Bx	Wh	D	Rv	D	180
Douglas Dolphin (F. Boat)	2-487	60′ 0″	45′ 2″	17′ 1″	592.0	46.1	29.8	17.4	48.5	37.4	Sp	Box	Sp	Trs	Ply							D	Rv	D	375
Martin 130		130′0″	90′11″	24′ 7″	2315.0[7]	204.6	94.1	65.6	203.6	152.2	D	Rv	D	Rv	D							D	Rv	D	1440
Seversky Sev-3M		36′ 0″	26′ 4″	9′ 9″	209.0	22.0	10.5	9.5	19.0	12.4	D	Mul	D	Mul	D	[8]		Gen. Sl				D	Rv	D	
Sikorsky S-43		84′ 0″	50′ 5″	17′ 9″	775.0	53.0	37.0	23.0	82.0	42.0	D	Trs	D	Trs	D,Fab	Ret	142	Aut 45″ Sl	Aut	Ol	Wh	D	Rv	D	Var
Sikorsky S-42-A	544	114′2″	67′ 8″	17′ 4″	1330.0	98.0	73.0	72.0	146.0	70.0	D	Trs	D	Trs	D Fab							D	Rv	D	Var
Viking V-2	361	42′ 4″	29′ 4″	10′ 4″	401.5	42.1	4.0	13.0	32.2	27.3	Sp	Box	Ply	G	Fab							W	G,Na	Ply	74
AUTOGIROS																									
Kellett KD-1		40′ 0″[11]	20′ 7″[9]	10′10″[9]			12.0		22.0		ST[10]	Cont	Ply	Ro	Ply	Tred	114	Aut 7x5	Aut	Aer	Wh	ST	Wl	Fab	30
Pitcairn PA-33		46′ 2″	21′10″	11′ 1″	1675.0[12]		2.6	5.3	25.2		ST[10]	Co n	Ply	Ro	Fab	Can	120	Aut 24″ Sl	Aut	Aer	Wh	ST	Wl	Fab	

A —Amphibian
Acp —Aircraft Prod
AD —Alclad
Aer —Aerol
Aero—Aeromarine
Al —Aluminum
Apl —Applied for
Aut —Autofan
Aw —Air Wheels
B —Biplane
Bo —Bolted
Box —Box spar
Bx —Bendix

C —Closed
Ca —Cable
Can —Cantilever
Cd —Cord
Cg —Corrugated
Cir —Cirrus
Com—Compression
Con —Continental
Cont—Continuous
Cs —Coiled Springs
Cv —Conventional
Cy —Cyclone

D —Alum. Alloy
Do —Douglas
Du —Dual
Ex —Extra
F —Flying Boat
Fab —Fabric
G —Glued
Gen.—General
Go —Goodyear
Ht —Heat treated
Hyd—Hydraulic
I —"I" section

In —Internal
Id —Inverted
Ja —Jacobs
K —Kinner
L —Landplane
Lam —Lambert
Lk —Lockheed
Lmd—Laminated
Lp —Low pressure
Ly —Lycoming
M —Monoplane
Me —Metal
Mech—Mechanical

Men—Menasco
Mg —Mahogany
Mo —Monocoque
Mul—Multiple
Na —Nailed
O —Open
Ol —Oleo
Old —Oildraulic
Op —Optional
Ply —Plywood
Pn —Pneumatic
Pnd—Pneudraulic

Pr —Push Rod
Pwh—P & W Hornet
Pwj —P & W Wasp, Jr.
Pww—P & W Wasp
Q —Sesquiplane
R —Rubber
Ret —Retractable
Ro —Routed
Rv —Riveted
S —Steel
SS —Stainless Steel
Sc —Shock Cord

Scd—Screwed
Sd —Stamped
Se —Security
Sh —Sheet
Sk —Skid
Sl —Streamline
Sol —Solid
Sp —Spruce
Spl —Split Axle
Spr—Spring
St —Standard
Str —Straight Axle

Sz —Szekely
T —Tubing
Tred—Treadle
Trs —Truss
W —Wood
War —Warner
Wb —Wire Braced
Wh —Wheel
Wi —Wire
Wl —Welded
Wr —Wright
Ww —Whirlwind

Foot Notes: *Licensed also as float type seaplanes. (†) Minor variations may occur among certain ships of same model designation. [1]Semi-retractable. [2]Including fin. [3]Including stabilizer. [4]Multi-cellular construction. [5]Single spar construction. [6]Inc. 168 sq. ft. in body airfoil. [7]Inc. effective area of seawings. [8]Combined wheel and float. [9]With rotor folded. [10]Structural details given apply to rotor blades. [11]Rotor diameter. [12]Disc Area. [13]4,000 Cargo, 1,000 Transport.

American engine specifications

AVIATION does not assume responsibility for the figures given

Manufacturer	Model	Cooling System	Cylinder Arrangement	Propeller Drive	Rating: H.P.	Rating: at R.P.M.	Rating: at Altitude, (ft.)	Rating: Octane Fuel	Weights: Total dry without hub[1] or starter	Weights: lb. per hp.	Bore and stroke (in.)	Displacement cu. in.	Compression Ratio	B.M.E.P.	Blower Ratio	Dimensions: Diam. Mount. Ring or CL. Bearers (in.)	Dimensions: Ht. or O.D. (in.)	Dimensions: Length (in.)	Guaranteed fuel consumption at rated hp. (lb.-hp.-hr.)	Oil Consumption (lb.-hp.-hr.)	Valve mechanism	Cylinder construction (See footnote)	No. valves per cyl.	Make spark plugs supplied with engine	Ignition	Carburetion	Starter	Are exhaust manifolds provided	Shipping wt. crated lb.	D. of C. License Number
Aeromarine Plane & Motor	AR-340	A	3-Rad	D	40	2050	S.L.	...	150	3.75	4 1/8 x 4	160	5.0	114	...	12 1/2	34 1/4	23 15/16	.55	.002	prr	Al,S	2	BG	2-B	1-Sg	Op	Yes	226	119
Aeromarine Plane & Motor	AR-3	A	3-Rad	D	50	2125	S.L.	...	150	3.00	4 1/8 x 4	160	5.0	114	...	12 1/2	34 1/4	23 15/16	.55	.002	prr	Al,S	2	BG	2-B	1-Sg	Op	Yes	226	74
Aeronautical Corp. of America	Aeronca E-113B	A	2-Hopp	D	40	2500	S.L.	73	121	3.02	4 1/4 x 4	113	5.40		...		26	24 1/8	.55	...	prr	Al,S	2	BG	1 B	1 Z	No	No	185	71
Continental Aircraft Eng. Co.	A-40-2	A	4-Hopp	D	37	2550	S.L.	63	144	3.90	3 1/16 x 3 1/4	115	5.20	100	...	8 1/2	19 7/16	27 5/16	.75	.025	Lh	Al,C	2	BG	1 B-Sc	1-Sg	.....	No	250	72
Continental Aircraft Eng. Co.	R-670-E,φG†	A	7-Rad	D	210	2000	S.L.	66	425	2.00	5 1/16 x 4 5/8	668	5.40	125	...	20	42 1/2	32 5/8	.55	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Op	§	850	80
Continental Aircraft Eng. Co.	R-670-F,†Hφ	A	7-Rad	D	225	2000	S.L.	80	425	1.90	5 1/16 x 4 5/8	668	6.10	135	...	20	42 1/2	32 5/8	.51	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Op	§	850	120
International Aircraft Corp	Heath B-4	A	4-L	D	25	2800	S.L.	...	119	4.70	2 3/4 x 3 1/2	...	4.50		...		24	25	.65	.019	Lh	C	2	.....	1-B	1-Z	No	No	.....	.....
Jacobs Aircraft Engine Co.	L-4	A	7-Rad	D	225	2000	S.L.	73	415	1.85	5 1/4 x 5	757	5.38	118	...	16 1/2	43 1/2	36 1/16	.55	.018	prr	Al,S	2	BG	B-Bat	1-Sg	Ec	No	760	121
Jacobs Aircraft Engine Co.	L-4M	A	7-Rad	D	225	2000	S.L.	73	440	1.96	5 1/4 x 5	757	5.38	118	...	16 1/2	43 1/2	35 1/16	.55	.018	prr	Al,S	2	BG	Sid	1-Sg	Ec	No	780	121
Jacobs Aircraft Engine Co.	L-4MA	A	7-Rad	D	225	2000	S.L.	73	440	1.96	5 1/4 x 5	757	5.38	118	...	16 1/2	43 1/2	35 1/16	.55	.018	prr	Al,S	2	BG	Sid	1-Sg	Eci	No	780	121
Kinner Airplane & Motor Co.	K-5	A	5-Rad	D	100	1810	S.L.	...	280	2.80	4 1/4 x 5 1/4	372	5.00	118	...	14	44 5/8	32 5/16	.55	.015	prr	Al,S	2	BG	2 B-Sc	1 Hy-Sg	Op	Yes	580	3
Kinner Airplane & Motor Co.	B-5	A	5-Rad	D	125	1925	S.L.	...	295	2.40	4 5/8 x 5 1/4	441	5.20	117	...	14	45 3/4	32 5/16	.55	.015	prr	Al,S	2	BG	2-Sc	1 Hy-Sg	Op	Yes	595	51
Kinner Airplane & Motor Co.	R-5	A	5-Rad	D	160	1975	S.L.	...	305	1.90	4 7/8 x 5 1/4	490	5.00	130	...	14	45 3/4	32 5/16	.55	.015	prr	Al,S	2	BG	2-Sc	1-Sg	Op	Yes	605	77
Kinner Airplane & Motor Co.	C-5	A	5-Rad	D	210	1900	S.L.	...	420	2.00	5 3/8 x 5 3/4	715	5.20	122	...	19 1/4	50	34 13/16	.55	.015	prr	Al,S	2	BG	2-Sc	1-Sg	Op	Yes	950	62
Kinner Airplane & Motor Co.	C-7	A	7-Rad	D	300	1800	S.L.	73	600	2.00	5 3/8 x 6	1044	5.30	126	1.00	20	51 5/16	44 1/8	.55	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Op	Yes	1130	122
Lambert Eng. & Machine Co.	R-266	A	5-Rad	D	90	2375	...	...	214	2.40	4 1/4 x 3 3/4	266	5.60		...	13 3/4	33	30 3/8	.58	.025	prr	Al,NI	2	Ch	2-Sc	1-Sg	Ec	.....	420	38
Lycoming Mfg. Co.	R-680-4	A	9-Rad	D	225	2100	S.L.	58	505	2.24	4 5/8 x 4 1/2	680	6.50	125	1.00	19 1/4	43 1/4	37 15/32	.55	.025	prr	Al,S	2	HT	Sid	1-Sg	Ec	Yes	930	108
Lycoming Mfg. Co.	R-680-2	A	9-Rad	D	240	2000	S.L.	80	505	2.10	4 5/8 x 4 1/2	680	6.50	136	1.00	19 1/4	43 1/4	37 15/32	.48	.025	prr	Al,S	2	HT	Sid	1-Sg	Ec	Yes	930	81
Lycoming Mfg. Co.	R-680-6△	A	9-Rad	D	245	2300	S.L.	58	505	2.06	4 5/8 x 4 1/2	680	5.50	123	1.00	19 1/4	43 1/4	37 15/32	.55	.025	prr	Al,S	2	HT	Sid	1-Sg	Ec	Yes	930	111
Lycoming Mfg. Co.	R-680-5△	A	9-Rad	D	260	2300	S.L.	80	505	1.94	4 5/8 x 4 1/2	680	6.50	132	1.00	19 1/4	43 1/4	37 15/32	.48	.025	prr	Al,S	2	HT	Sid	1-Sg	Ec	Yes	930	110
Menasco Mfg. Co.	B-4	A	4-IdL	D	95	2000	...	72	285	3.00	4 1/2 x 5 1/16	326	5.50	115	...	11 1/16	28	47 3/4	.54	.006	prr	Al,NI	2	BG	2 Sc-B*	1-Sg	Ec-B	No	440	65
Menasco Mfg. Co.	C-4	A	4-IdL	D	125	2175	...	72	290	2.32	4 3/4 x 5 1/16	363	5.50	125	...	11 1/16	28	47 3/4	.50	.010	prr	Al,NI	2	BG	2 Sc-B*	1-Sg	Ec-B	No	450	67
Menasco Mfg. Co.	C-4S	A	4-IdL	D	150	2260	3000	72	305	2.03	4 3/4 x 5 1/16	363	5.50	157	9.60	11 1/16	28 9/16	47 17/32	.56	.010	prr.	Al,NI#	2	BG	2 Sc-B*	1-Sg	Ec	No	460	134
Menasco Mfg. Co.	B-6	A	6-IdL	D	160	1975	...	72	385	2.40	4 1/2 x 5 1/16	489	5.50	130	...	11 7/8	28 5/16	59 7/16	.54	.006	prr	Al,NI	2	BG	2-B	1-Sg	Ec	No	630	68
Menasco Mfg. Co.	B-6S	A	6-IdL	D	200	2250	4500	72	415	2.07	4 1/2 x 5 1/16	489	5.50	157	8.75	11 7/8	28 5/16	59 7/16	.56	.018	prr	Al,NI#	2	BG	2-B	1-Sg	Ec	No	683	139
Pratt & Whitney Aircraft Co.	Wasp, Jr. T1B	A	9-Rad	D	320	2000	S.L.	73	596	1.86	5 3/16 x 5 3/16	985	5.00	129	8.00	23 3/16	45 3/4	42 1/8	.50‡	.035	prr	Al,S	2	BG-HT	2-Sc	1-Sg	Ec	No	Var	113
Pratt & Whitney Aircraft Co.	Wasp, Jr. TB	A	9-Rad	D	400	2200	S.L.	80	596	1.49	5 3/16 x 5 3/16	985	6.00	146	8.00	23 3/16	45 3/4	42 1/8	.48‡	.035	prr	Al,S	2	BG-HT	2-Sc	1-Sg	Ec	No	Var	85
Pratt & Whitney Aircraft Co.	Wasp, Jr. SB	A	9-Rad	D	400	2200	5000	80	596	1.49	5 3/16 x 5 3/16	985	6.00	146	10.00	23 3/16	45 3/4	42 1/8	.48‡	.035	prr	Al,S	2	BG-HT	2-Sc	1-Sg	Ec	No	Var	123
Pratt & Whitney Aircraft Co.	Wasp S1-H1-G	A	9-Rad	G[1]	550	2200	8000	87	875	1.58	5 3/4 x 5 3/4	1340	6.00	147	12.00	23 3/16	51 7/16	48 1/4	.48‡	.035	prr	Al,S	2	BG-HT	2-Sc	1-Sg	Ec	No	Var	129
Pratt & Whitney Aircraft Co.	Wasp S2-H1-G	A	9-Rad	G[1]	500	2200	10,500	87	875	1.75	5 3/4 x 5 3/4	1340	6.00	134	12.00	23 3/16	51 7/16	48 1/4	.48‡	.035	prr	Al,S	2	BG-HT	2-Sc	1-Sg	Ec	No	Var	Pdg
Pratt & Whitney Aircraft Co.	Wasp S3-H1	A	9-Rad	D	550	2200	5000	80	781	1.42	5 3/4 x 5 3/4	1340	6.00	147	10.00	23 3/16	51 7/16	43 3/16	.48‡	.035	prr	Al,S	2	BG-HT	2-Sc	1-Sg	Ec	No	Var	Pdg
Pratt & Whitney Aircraft Co.	Wasp S3-H1-G	A	9-Rad	G[1]	550	2200	5000	80	875	1.55	5 3/4 x 5 3/4	1340	6.00	147	10.00	23 3/16	51 7/16	48 1/4	.48‡	.035	prr	Al,S	2	BG-HT	2-Sc	1-Sg	Ec	No	Var	Pdg
Pratt & Whitney Aircraft Co.	Wasp T1-H1	A	9-Rad	D	525	2100	S.L.	80	781	1.48	5 3/4 x 5 3/4	1340	6.00	147	10.00	23 3/16	51 7/16	43 3/16	.48‡	.035	prr	Al,S	2	BG-HT	2-Sc	1-Sg	Ec	No	Var	Pdg
Pratt & Whitney Aircraft Co.	Twin Wasp, Jr. S1-A1-G	A	14-Rad	S G[1-2]	650	2400	7000	80	999	1.58	5 3/16 x 5 3/16	1535	6.00	140	10.00	23 3/16	43 7/16	54 1/2	.48‡	.035	prr	Al,S	2	BG-HT	2-Sc	1-Sg	Ec	No	Var	107
Pratt & Whitney Aircraft Co.	Twin Wasp, Jr. SA1-G	A	14-Rad	S G[1-2]	700	2500	8500	87	999	1.42	5 3/16 x 5 3/16	1535	6.50	143	10.00	23 3/16	43 7/16	54 1/2	.48‡	.035	prr	Al,S	2	BG-HT	2-Sc	1-Sg	Ec	No	Var	95
Pratt & Whitney Aircraft Co.	Twin Wasp SA2-G	A	14-Rad	S G[1]	750	2400	6500	80	1174	1.56	5 1/2 x 5 1/2	1830	6.00	135	10.00	23 3/16	47 7/8	56 1/4	.48‡	.035	prr	Al,S	2	BG-HT	2-Sc	1-Sg	Ec	No	Var	Pdg
Pratt & Whitney Aircraft Co.	Twin Wasp S1-A2-G*	A	14-Rad	S G[1]	800	2400	7000	87	1174	1.46	5 1/2 x 5 1/2	1830	6.50	144	11.00	23 3/16	47 7/8	56 1/4	.48‡	.035	prr	Al,S	2	BG-HT	2-Sc	1-Sg	Ec	No	Var	137
Pratt & Whitney Aircraft Co.	Hornet SD	A	9-Rad	D	675	2050	6000	87	880	1.30	6 1/16 x 6 3/8	1690	6.50	154	12.00	23 3/16	54 7/16	45 3/4	.48‡	.035	prr	Al,S	2	BG-HT	2-Sc	1-Sg	Ec	No	Var	106
Pratt & Whitney Aircraft Co.	Hornet SD-G	A	9-Rad	G[1]	700	2150	6500	87	980	1.40	6 1/16 x 6 3/8	1690	6.50	152	12.00	23 3/16	54 7/16	50 3/4	.48‡	.035	prr	Al,S	2	BG-HT	2-2c	1-Sg	Ec	No	Var	105
Pratt & Whitney Aircraft Co.	Hornet S1E-G	A	9-Rad	G[1]	750	2250	7000	87	1015	1.35	6 1/16 x 6 3/8	1690	6.50	156	12.00	23 3/16	54 7/16	51	.48‡	.035	prr	Al,S	2	BG-HT	2-Sc	1-Sg	Ec	No	Var	136
Pratt & Whitney Aircraft Co.	Hornet S2E-G	A	9-Rad	G[1]	750	2250	3000	87	1015	1.35	6 1/16 x 6 3/8	1690	6.00	156	10.00	23 3/16	54 7/16	51	.48‡	.035	prr	Al,S	2	BG-HT	2-Sc	1-Sg	Ec	No	Var	Pdg
Pratt & Whitney Aircraft Co.	Hornet S3E	A	9-Rad	D	650	2050	5500	80	920	1.41	6 1/16 x 6 3/8	1690	6.00	133	11.00	23 3/16	54 7/16	45 3/16	.48‡	.035	prr	Al,S	2	BG-HT	2-Sc	1-Sg	Ec	No	Var	Pdg
Pratt & Whitney Aircraft Co.	Hornet S3E-G	A	9-Rad	G[1]	675	2250	6100	80	1015	1.50	6 1/16 x 6 3/8	1690	6.00	141	11.00	23 3/16	54 7/16	51	.48‡	.035	prr	Al,S	2	BG-HT	2-Sc	1-Sg	Ec	No	Var	Pdg
Pratt & Whitney Aircraft Co.	Hornet S3D1-G	A	9-Rad	G[1]	650	2150	5000	80	980	1.54	6 1/16 x 6 3/8	1690	6.00	141	10.00	23 3/16	55 7/16	50 3/4	.48‡	.035	prr	Al,S	2	BG-HT	2-Sc	1-Sg	Ec	No	Var	117
Pratt & Whitney Aircraft Co.	Hornet S4-D1	A	9-Rad	D	650	2050	3000	80	880	1.35	6 1/16 x 6 3/8	1690	6.00	149	10.00	23 3/16	55 7/16	45 3/4	.48‡	.035	prr	Al,S	2	BG-HT	2-Sc	1-Sg	Ec	No	Var	100
Pratt & Whitney Aircraft Co.	Hornet S5E	A	9-Rad	D	700	2050	6000	87	920	1.31	6 1/16 x 6 3/8	1690	6.50	160	13.00	23 3/16	54 7/16	45 3/8	.48‡	.035	prr	Al,S	2	BG-HT	2-Sc	1-Sg	Ec	No	Var	Pdg
Pratt & Whitney Aircraft Co.	Hornet T1-D1	A	9-Rad	D	675	2000	S.L.	87	880	1.30	6 1/16 x 6 3/8	1690	6.00	158	10.00	23 3/16	55 7/16	45 3/4	.48‡	.035	prr	Al,S	2	BG-HT	2-Sc	1-Sg	Ec	No	Var	92
Pratt & Whitney Aircraft Co.	Hornet T1-D1-G	A	9-Rad	G[1]	675	2150	S.L.	87	980	1.40	6 1/16 x 6 3/8	1690	6.00	147	10.00	23 3/16	55 7/16	50 3/4	.48‡	.035	prr	Al,S	2	BG-HT	2-Sc	1-Sg	Ec	No	Var	109
Pratt & Whitney Aircraft Co.	Hornet T1E	A	9-Rad	D	725	2050	S.L.	87	920	1.26	6 1/16 x 6 3/8	1690	6.00	166	11.00	23 3/16	54 7/16	45 3/8	.48‡	.035	prr	Al,S	2	BG-HT	2-Sc	1-Sg	Ec	No	Var	Pdg
Pratt & Whitney Aircraft Co.	Hornet T2-D1	A	9-Rad	D	635	2000	S.L.	80	880	1.38	6 1/16 x 6 3/8	1690	6.00	149	10.00	23 3/16	55 7/16	45 3/4	.48‡	.035	prr	Al,S	2	BG-HT	2-Sc	1-Sg	Ec	No	Var	99
Pratt & Whitney Aircraft Co.	Hornet T2E-G	A	9-Rad	G[1]	750	2250	S.L.	87	1015	1.35	6 1/16 x 6 3/8	1690	6.00	156	10.00	23 3/16	54 7/16	51	.48‡	.035	prr	Al,S	2	BG-HT	2-Sc	1-Sg	Ec	No	Var	Pdg
Ranger Engineering Corp.	Ranger 6-390	A	6-IdL	D	120	2150	...	57	350	2.92	4 x 5 1/2	386	5.20	115	...	⊕	31 25/32	50 27/32	.55	.020	ohc	Al,S	2	BG-HT	2-Sc	1-Sg	Ec	No	730	57
Ranger Engineering Corp.	Ranger 6-390B	A	6-IdL	D	145	2250	...	73	350	2.33	4 x 5 1/2	386	6.00	134	...	⊕	31 25/32	50 27/32	.55	.020	ohc	Al,S	2	BG-HT	2-Sc	1-Sg	Ec	No	730	Pdg
Ranger Engineering Corp.	Ranger V-770-SG	A	12-IdV	G[1]	420	2800	...	87	600	1.43	4 x 5 1/2	773	6.00	154	7.71	15 1/2	31 29/32	59 27/32	.56	.025	ohc	Al,S	2	BG-HT	Sid	1-Sg	Ec	No	1150	84
Rover Engines	267	A	4-IdL	D	75	1975	S.L.	...	232	3.10	4 1/16 x 5	267	5.10		...	14	32	42	.55	.010	prr	Al,C	2	Ac	Sid	1-Sg	.....	Yes	370	37
Warner Aircraft Corp.	Scarab, Jr.	A	5-Rad	D	90	2025	S.L.	...	230	2.50	4 1/4 x 4 1/4	301	5.20	115	...	17	36 9/16	28 1/2	.55	.020	prr	Al,S	2	Ac	2-Sc	1-Hy	Op	No	485	54
Warner Aircraft Corp.	Scarab	A	7-Rad	D	125	2050	...	...	285	2.25	4 1/4 x 4 1/4	422	5.20	114	...	17	36 9/16	28 7/8	.55	.025	prr	Al,S	2	Ac	2-Sc	1-Sg	Op	No	505	2
Warner Aircraft Corp.	Super Scarab	A	7-Rad	D	145	2050	...	...	300	2.05	4 5/16 x 4 3/4	499	5.30	114	...	17	36 9/16	28 7/8	.55	.025	prr	Al,S	2	Ac	2-Sc	1-Sg	Op	No	520	104
Wright Aeronautical Corp.	Whirlwind 175	A	5-Rad	D	175	2000	S.L.	73	415	2.38	5 x 5 1/2	540	5.10	128	7.05	19 1/4	45	41 3/32	.55	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	Yes	930	23
Wright Aeronautical Corp.	Whirlwind 250	A	7-Rad	D	250	2000	S.L.	73	495	1.98	5 x 5 1/2	756	5.10	131	7.05	19 1/4	45	41 9/32	.55	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	Yes	1010	26
Wright Aeronautical Corp.	Whirlwind ET	A	7-Rad	D	235	2000	S.L.	73	500	2.12	5 x 5 1/2	756	6.00	...	...	19 1/4	45	41 9/32	.55	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	Yes	1015	126
Wright Aeronautical Corp.	Whirlwind 285	A	7-Rad	D	285	2000	S.L.	73	505	1.77	5 x 5 1/2	756	6.00	142	7.05	19 1/4	45	41 9/32	.55	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	Yes	1010	94
Wright Aeronautical Corp.	Whirlwind 330	A	9-Rad	D	330	2000	S.L.	73	575	1.74	5 x 5 1/2	973	5.10	134	7.84	19 1/4	45	41 27/32	.55	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	Yes	1110	21
Wright Aeronautical Corp.	Whirlwind 330-G	A	9-Rad	G[3-4]	330	2050	S.L.	73	630	1.91	5 x 5 1/2	973	5.10	132	7.84	19 1/4	45	45 11/32	.55	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	Yes	1165	21
Wright Aeronautical Corp.	Whirlwind 365	A	9-Rad	D	365	2100	S.L.	73	595	1.63	5 x 5 1/2	973	6.00	142	7.84	19 1/4	45	41 27/32	.55	.025	prr	Al,S	2	BG	2-2c	1-Sg	Ec	Yes	1120	87
Wright Aeronautical Corp.	Whirlwind 365-G	A	9-Rad	G[3-4]	365	2150	S.L.	73	645	1.76	5 x 5 1/2	973	6.00	140	7.84	19 1/4	45	45 11/32	.55	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	Yes	1175	87
Wright Aeronautical Corp.	Whirlwind 420	A	9-Rad	D	420	2150	S.L.	80	595	1.41	5 x 5 1/2	973	6.00	158	10.15	19 1/4	45	41 27/32	.55	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	Yes	1120	78
Wright Aeronautical Corp.	Whirlwind 420-G	A	9-Rad	G[3-4]	420	2200	S.L.	80	645	1.53	5 x 5 1/2	973	6.00	156	10.15	19 1/4	45	45 11/32	.55	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	Yes	1175	64
Wright Aeronautical Corp.	Whirlwind 440	A	9-Rad	D	440	2200	S.L.	87	600	1.36	5 x 5 1/2	973	6.30	163	10.15	19 1/4	45	41 27/32	.55	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	Yes	1175	125
Wright Aeronautical Corp.	Whirlwind 440-G	A	9-Rad	G[3-4]	440	2250	S.L.	87	645	1.47	5 x 5 1/2	973	6.30	159	10.15	19 1/4	45	45 11/32	.55	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	No	1560	.....
Wright Aeronautical Corp.	Whirlwind STR-1510-C	A	14-Rad	S G[3]	715	2400	6500	87	985	1.38	5 x 5 1/2	1512	7.0	...	...	...	45	49 1/8	.61	.035	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	No	1700	89
																				.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	No	1700	89

Wright Aeronautical Corp.	Whirlwind 420-G	A	9-Rad	G[3-4]	420	2200	S.L.	80	645	1.53	5x5½	973	6.00	156	10.15	19¼	45	45 1⅜₃₂	.55	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	Yes	1175	64
Wright Aeronautical Corp.	Whirlwind 440	A	9-Rad	D	440	2200	S.L.	87	600	1.36	5x5⅛	973	6.30	163	10.15	19¼	45	41 2⅞₃₂	.55	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	Yes	1120	125
Wright Aeronautical Corp.	Whirlwind 440-G	A	9-Rad	G 3-4	440	2250	S.L.	87	645	1.47	5x5½	973	6.30	159	10.15	19¼	45	45 1⅜₃₂	.55	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	Yes	1175	125
Wright Aeronautical Corp.	Whirlwind STR-1510-C1	A	14-RadS	G[2]	715	2400	6500	87	985	1.38	5x5 ½	1512	7.0	....	5.95	.....	45	49 ⅜	.61	.035	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	No	1560	....
Wright Aeronautical Corp.	Cyclone R-1820-F1	A	9-Rad	D	715	1950	S.L.	87	945	1.32	6⅛x7⅛	1823	6.40	159	5.95	23⅜	53¾	43⅜	.60	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	No	1700	89
Wright Aeronautical Corp.	Cyclone GR-1820-F1	A	9-Rad	D	700	1950	S.L.	87	1038	1.48	6⅛x7⅛	1823	6.40	155	5.95	23⅜	53¾	48⅛	.61	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	No	1800	89
Wright Aeronautical Corp.	Cyclone SR-1820-F2	A	9-Rad	D	735	1950	4000	87	945	1.28	6⅛x7⅛	1823	6.40	163	7.00	23⅜	53¾	43⅜	.60	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	No	1700	98
Wright Aeronautical Corp.	Cyclone SG-1820-F2	A	9-Rad	G[5]	750	1950	2500	87	1038	1.38	6⅛x7⅛	1823	6.40	159	7.00	23⅜	53¾	48⅛	.61	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	No	1800	98
Wright Aeronautical Corp.	Cyclone SR-1820-F3	A	9-Rad	D	710	1950	7000	87	945	1.33	6⅛x7⅛	1823	6.40	159	8.30	23⅜	53¾	43⅜	.60	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	No	1700	103
Wright Aeronautical Corp.	Cyclone SGR-1820-F3	A	9-Rad	G[5]	710	1950	7000	87	1038	1.46	6⅛x7⅛	1823	5.75	155	8.30	23⅜	53¾	48⅛	.61	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	No	1800	103
Wright Aeronautical Corp.	Cyclone R-1820-F11	A	9-Rad	D	690	1950	S.L.	80	937	1.36	6⅛x7⅛	1823	5.75	153	5.95	23⅜	53¾	43⅜	.60	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	No	1700	97
Wright Aeronautical Corp.	Cyclone GR-1820-F11	A	9-Rad	G[5]	690	1950	S.L.	80	1030	1.49	6⅛x7⅛	1823	6.40	153	5.95	23⅜	53¾	48⅛	.61	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	No	1800	97
Wright Aeronautical Corp.	Cyclone SR-1820-F31	A	9-Rad	D	670	1900	2500	80	937	1.40	6⅛x7⅛	1823	6.40	149	5.95	23⅜	53¾	43⅜	.60	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	No	1700	101
Wright Aeronautical Corp.	Cyclone SGR-1820-F31	A	9-Rad	G[5]	650	1900	2500	80	1030	1.59	6⅛x7⅛	1823	6.40	144	5.95	23⅜	53¾	48⅛	.61	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	No	1800	101
Wright Aeronautical Corp.	Cyclone SR-1820-F32	A	9-Rad	D	675	1950	6500	80	945	1.40	6⅛x7⅛	1823	6.40	150	7.00	23⅜	53¾	43⅜	.60	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	No	1700	135
Wright Aeronautical Corp.	Cyclone SGR-1820-F32	A	9-Rad	G[5]	650	1950	6500	80	1038	1.59	6⅛x7⅛	1823	6.40	144	7.00	23⅜	53¾	48⅛	.61	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	No	1800	135
Wright Aeronautical Corp.	Cyclone SR-1820-F33	A	9-Rad	D	650	1950	9500	80	945	1.45	6⅛x7⅛	1823	6.40	144	8.30	23⅜	53¾	43⅛	.60	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	No	1700	118
Wright Aeronautical Corp.	Cyclone SGR-1820-F33	A	9-Rad	G[5]	635	1950	9500	80	1038	1.63	6⅛x7⅛	1823	6.40	141	8.30	23⅜	53¾	48⅛	.61	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	No	1800	118
Wright Aeronautical Corp.	Cyclone R-1820-F21	A	9-Rad	D	660	1950	S.L.	73	937	1.42	6⅛x7⅛	1823	5.30	146	5.95	23⅜	53¾	43⅛	.60	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	No	1700	93
Wright Aeronautical Corp.	Cyclone GR-1820-F21	A	9-Rad	G[5]	660	1950	S.L.	73	1030	1.56	6⅛x7⅛	1823	5.30	146	5.95	23⅜	53¾	48⅛	.61	.025	prr	Al,S	2	BG	2-Sc	1-Sg	Ec	No	1800	93
Wright Aeronautical Corp.	Conqueror V-1570-F1	W	12-V	D	655	2400	S.L.	73	900	1.38	5⅛x6¼	1587	6.50	136	.....	15¾	39¼	64	.53	025	ohc	Al,S	4	BG	1-Sc	1-Sg	Ec	No	.....	6
Wright Aeronautical Corp.	Conqueror GV-1570-F2	W	12-V	G[3-7]	675	2450	S.L.	87	996	1.47	5⅛x6¼	1587	7.25	138	.....	15¾	39¼	64	.61	025	ohc	Al,S	4	BG	1-Sc	1-Sg	Ec	No	.....	131
Wright Aeronautical Corp.	Conqueror SGV-1570-F4	W	12-V	G[3-7]	705	2450	7000	87	1110	1.58	5⅛x6¼	1587	6.50	143	9.94	15¾	39¼	64	.61	025	ohc	Al,S	4	BG	1-Sc	1-Sg	Ec	No	.....	132

Footnotes:

A —Air cooled
Al —Aluminum
Apl—Applied for
B —Bosch
Bat.—Battery ignition
C —Cast iron
Ch —Champion
com—Compression
D —Direct
DM—Dual Magneto
Ec —Eclipse
Eci —Eclipse air injection
G —Geared
G[1] —3:2 reduction gear
G[2] —4:3 reduction gear
G[3]—2:1 reduction gear
G[4]—1.58:1 reduction gear
G[5]—16:11 reduction gear
G[6]—8:5 reduction gear
G[7]—7:5 reduction gear
H —Horizontal
HT—Hurley-Townsend
Hy —Holley
Id —Inverted
L —Cylinder in line
Lh —"L" head
M —Magneto
NI —Nickel iron
Op —Optional
Opp—Opposed
ohc —Overhead cam
Pdg —Pending
prr —push rods and rocker arms
Rad—Radial
Rad S—Staggered Radial
S.L. —Sea level
Sc —Scintilla
Sid —Scintilla—Dual Magneto
Sg —Stromberg
S —Steel
V —Vee
Var—Variable
W —Liquid cooled
Z —Zenith
ϕ —Steel Barrels optional
‡ —Fuel consumption at cruising power
⊕ —15 in. front, 17 in. rear

* Optional battery ignition. ϕ With rear exhaust outlet heads † With front exhaust outlet heads § With front exhaust outlets, yes; with rear exhaust outlets, no △ For use only with controllable propellers

THE BUYERS' LOG BOOK

AVIATION'S *Card Index of New Equipment*

This department is equipped to help readers locate manufacturers of any parts, accessories or materials

AIRPLANE ACCESSORIES — **Aircraft Fuses**

Littelfuse Laboratories,
4507 Ravenswood Ave., Chicago, Ill.

IMPORTANT anti-vibration feature of Littelfuses, for airship and aircraft radio transmitters, is a 90 deg. twist given the fusable link at the center. End caps, tubes, and fuse element are locked together with special solder. Low voltage types, glass enclosed, 25-250 volts. High voltage series, fiber enclosed, rated for 1,000, 2,500, 3,000 volt service.

AVIATION, *April, 1935*

AIRPORT EQUIPMENT — **Emergency Light**

National Carbide Sales Corp.,
Lincoln Building, New York, N. Y.

A NEW 8,000 cp. emergency carbide light adaptable to airport use weighs 40 lb. when fully charged, burns three hours or longer when operated intermittently on a 1¾ lb. charge. A non-spill feature is incorporated. Reflector, mounted on a universal swing joint, shifts light to any angle. Folds for carrying by handle above carbide hopper. When extended 3½ ft. high; 28 in. when folded.

AVIATION, *April, 1935*

AIRPORT EQUIPMENT — **Fire Extinguisher**

Pyrene Manufacturing Co.,
Newark, N. J.

NEW 2-qt. vaporizing liquid fire extinguisher discharges by air pressure. Delivers fan-shaped spray or solid stream. No built-in pump, pressure renewable at any air line having 100 lb. pressure. Weight: 16½ lb. fully charged; 18 in. high, 5 in. diameter. Is operated by opening valve on top and controlling combination discharge nozzle. Circular available.

AVIATION, *April, 1935*

ENGINE ACCESSORIES — **Battery Ignition Units**

Scintilla Magneto Co.,
Sydney, New York

NEW radio shielded timers, coils, ignition switches for lighter aircraft engines is announced. Type WL timer, ball bearing mounted, grease packed, available for conventional timer mounting or for magneto replacement base. Single or double breakers. Centrifugal spark governor built in. Ignition switch has independent battery and generator leads as safety feature.

AVIATION, *April, 1935*

RADIO — **Aircraft Radio (catalog)**

Lear Developments Inc.,
125 W. 17th Street, New York, N. Y.

COMPLETE description of all Lear products and manufacturing facilities contained in new bulletin "Aircraft Radio." Covers the special equipment built for the London-Melbourne race, also standard products,—the Model K Direction Finder; the K-3 Band receiver, the Model LACT-3 transport transmitter, and the 10 watt and 35 watt (LACT-1) transmitter for the private flyer.

AVIATION, *April, 1935*

RADIO — **Airplane Receiver**

Western Electric Co.,
195 Broadway, New York, N. Y.

FOR weather and beacon signal service for the private pilot new receiver measures 7¾ in. each way, weighs 11 lb., covers the 200/400 kc. or 550/1,500 kc. bands. Superheterodyne circuit, only three tubes, requires short antenna, operates with earphones. Filaments supplied from 6 or 12-volt battery. Plate supply 16 milliamps. at 90 volts, permitting use of dry B-battery.

AVIATION, *April, 1935*

RADIO EQUIPMENT — **Radio Receiver**

Seabury & Sons, Inc.,
Boonton, N. J.

MODEL SBR-2 beacon receiver, designed primarily for private flyer, is a four-tube superheterodyne, 194 to 420 kc. frequency, with output of 750 milliwatts and sensitivity of 1 microvolt. Receiver designed for panel mounting but may be mounted where convenient as shockproofing not required. Equipped with shielded phone lead and jack box. 6¼ lb. for battery operation; with dynamotor 14 lb.

AVIATION, *April, 1935*

SHOP EQUIPMENT — **Battery Tester**

General Electric Co.,
Bridgeport, Conn.

TUNGAR battery-cell tester may be used both for high-rate discharge tests or for open-circuit tests. Formed to fit the hand of the operator. Large, easily read meter at top of handle (imbedded in rubber guard for protection) has usual voltage scale, also subdivisions to simplify readings. Switch, of thumbscrew type, is between the two cadmium-plated battery prods.

AVIATION, *April, 1935*